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[OFFICIAL NOTICE.]

Secretary's Notice in the Matter of Railway Fares—Western Gas Association.

SECRETARY'S OFFICE, WESTERN GAS ASSOCIATION,
QUINCY, ILL., March 29, 1886.

The Ninth Annual Meeting of the Western Gas Association will be held at the Neil House, Columbus, Ohio, on the 12th, 13th and 14th days of May.

A reduction in transportation rates has been secured (available to members who will be in attendance) over all roads within the jurisdiction of the Central Passenger Committee. These embrace the principal lines of the country east of the Mississippi River; and this arrangement will therefore benefit the great majority of our members, as well as many of our Eastern brethren whom we hope to have with us. As the list is rather lengthy for publication in these columns, including, as it does, the names of some forty railway companies, and as your Secretary is naturally anxious to enable those who will be in attendance at our re-union to avail themselves of the opportunity for securing a reduction in their traveling expenses, he wishes all who desire to profit by this plan to inform him, *at once*, of their intention to be present at our May meeting. He will then issue to each member the necessary credentials, and give explicit information as to the steps that must be taken to secure the discount, which effects a saving of one-third the regular fare. Our members must distinctly understand, however, that this reduction will not apply unless at least fifty tickets are sold under this arrangement. Of course, the actual number in attendance will be at least triple this figure; but, as stated above, at least fifty members must avail themselves of this reduced rate in order to make the concession binding upon the railroad companies. Therefore, let every one who intends to be present on the occasion of our Ninth Annual, or who has reason to think that it is at all likely that he will be at Columbus next month, inform us of the fact without delay, so that this question can be promptly and satisfactorily arranged. Even our Ohio members, living within a comparatively short distance of Columbus, and who have but little to gain by so doing, should take advantage of this opportunity, as it will favor those of the fraternity who are obliged to make the longer, and hence more expensive, journeys.

Your Secretary cannot too strongly insist upon the necessity of your taking immediate steps in this matter.

Respectfully,

A. W. LITTLETON, Sec'y.

THE SPRINGFIELD MEETING OF THE OHIO GAS LIGHT ASSOCIATION.

The historical ides of March (or at least the simon-pure March ide for '86) saw the JOURNAL's representatives with gripsacks in hand, "wending their way" through Cortlandt street—New York's busy thoroughfare so often trod by those who seek to travel by the aid of the mammoth route known to transportation fame as the Pennsylvania Railroad Company. A short wait in the Jersey City terminus is ended by the doorkeeper's sonorous cry of, "Philadelphia, Pittsburgh, and the West!" the usual minute or two of bustle, din and questioning; then into comfortable seats; the shrieky warning of the snorting iron horse; the swish of the conductor's bell rope—off we glide in the first gloom of the closing night. Without particularly notable incident, although our eyes were occasionally permitted to catch a glimpse

of velvety fields of early wheat (which foretold the near approach of vegetation's rejuvenescence) Columbus was reached, from which point the aid of the I. B. & W. Railway had to be invoked so that the comfortable quarters of mine host (Mr. H. L. Rockfield) of the Arcade Hotel at Springfield might be reached in time. At Columbus we espied Brother McMillin, and having an hour or so to spare, that period was devoted to an inspection of the Columbus gas works. Dollar-and-a-quarter gas, "Mac" assured us, was not by any means a poor affair after all; and he seemed inclined to think that the Columbus shareholders were likely to continue receiving modest dividend checks when the usual dividend dates were "thrown up by the calendar." We forgot to inquire after Dr. Robinson; but take it for granted the Dr. is "doing quite well." The I. B. & W. lost no time in spinning over the 45-mile stretch betwixt Columbus and Springfield, and Secretary Butterworth knew whereof he spoke when noting that the Arcade would be found to be a comfortable abiding place; and we would like to add that what Mr. A. S. Bushnell (President of the Springfield Gas Light Company, and chairman of the local committee of arrangements for the Association) does not know about receiving, welcoming, and attending to the wants of his brother members and their guests, is past all finding out.

On the morning of the 17th quite a large contingent of the Ohio clans had reported; and amongst the visitors we quickly spied the well-known form and face of the President of the Western Association—Mr. Jas. Somerville, of Indianapolis; later on loomed up the "ministerial" visage of the irrepressible Vincennes (Ind.) gas man—Brother G. G. Ramsdell; and then came smilingly forward no less a personnge than Mr. E. J. King, of Jacksonville, Ills.

When the timepieces marked 2 P.M. the Arcade parlor was invaded, and Gen. Hickenlooper assumed command. Roll call developed an attendance of close on to 50 members, and Sec. Butterworth had the pleasure of adding twelve names to the list of membership before the sessions terminated. As to the General's annual address, we speak but the plain truth in characterizing it as one of the most forcible documents ever brought before the attention of our readers. Admirable in composition, decisive and complete in the lessons intended to be taught, convincing in its logic—in short, it leaves untouched none of the vital questions that to-day are involved in the policy of the American gas maker. Possibly the General may be fairly accused of having dealt too harshly with the Massachusetts gas commission measure. The framers of that law at no time claimed perfection for it; and, even admitting that it may and does possess weak or unsatisfactory features, it nevertheless appears on the record as the pioneer instrument. Under the skilful adaptation of laws similar in purport, even though they differ widely in framing from that enacted in Massachusetts, rests the hope that the near future will witness the solution of the evils which have so long menaced the financial stability of gas undertakings, and thus in many cases prevented the public from securing cheap gas light. We only hope that Ohio will take the General at his word; and certainly that which he proposes is not only fair and just, but is also liberal to the last degree.

The General would seem to incline to the belief that natural gas is not destined to long life or permanence; and we are prepared to accept Prof. Orton's theory. The retort house is likely to live; and its resources are inexhaustible. Neither natural gas nor electric lighting is a tithe as lusty a competitor of the gas man as is the universal enemy—kerosene oil. The General's remedy—that of low prices—is the proper specific. In conclusion we would say that, like the skilful tactician he is, General Hickenlooper reserves a heavy shot for his final charge. To the youngsters of the profession we would say, "Form your plan of attack on the lines pointed out, and victory is certain."

After the address had been referred to a special committee, and some necessary routine business was disposed of, the reading of papers was commenced. Thirteen members presented contributions; and, while all were good, it may be said that Mr. McMillin's notes on "Comparative Values of Coals for Gas Making" evoked the greatest interest. An evening session occupied the time between 7:30 and 9:30 o'clock of Wednesday; and then the party adjourned to the dining room of the hotel, in which, at the instance of Mr. A. S. Bushnell, of the Springfield Gas Company, an elegant lunch had been provided. Members and guests to the number of 82 enjoyed the good things so temptingly displayed. Gen. Hickenlooper having been called back to Cincinnati, Vice-President Reinmund assumed the duties of director—successfully, of course. Mr. Bushnell gave a most interesting account of the origin and growth of the Springfield Gas Company, which narrative we will take the liberty of repeating to our readers at a later date. The feast hour lasted until the birth of Thursday, and over its memory many pleasant recollections linger.

A business session was held on Thursday (commencing at 9:30 A. M.), at which the list of papers was finished. Then came the election of officers, and this resulted in the choice of Emerson McMillin as President; Joseph Light, Vice-President; Irvin Butterworth, Secretary; and Jas. A. Raynolds, Treasurer—all "good men and true." The afternoon was devoted to an inspection of the Springfield gas works; and looking upon the complete and handsome establishment then and there seen it was rather hard to fancy the image (portrayed by Mr. Bushnell on the night before) of that plant as it existed in 1849, when a retort house 25 × 30 feet was put up to cover a lonesome bench of three cast iron retorts. However, the Springfield of '86 is in all respects a far different Springfield from that of '49. The premises having been thoroughly inspected, Mr. Bushnell "sprang another treat" upon the boys, and at his invitation line of march to the building containing the gems of the Bookwalter collection of ancient and modern art was taken. Mr. Bookwalter had most generously consented to place his immense collection of valuable curios from foreign lands on exhibition for the benefit of the charities of the city, and by his invitation Mr. Bushnell gratified the esthetic sense of his brother members, and paid his tribute to "sweet charity." Indeed an examination of the Bookwalter collection would alone well repay a trip betwixt New York and Springfield. With the approaching sunset came the hour for final parting, and with many frank and hearty salutations ringing in our ears, good-bye was said to Ohio's thriving city. We cannot here take final leave of the Ohio Association's second annual gathering without thanking the members for their action towards us—fraternal, frank and happy it surely was. Honorary membership in such a body is something to be proud of; and when the Ohio's muster roll is called at Dayton, in 1887, we hope to answer, "Yea."

AGITATING THE FORMATION OF AN INDIANA GAS LIGHT ASSOCIATION.

The Indiana gas men are discussing the project of the formation of an Association for that State; and it may be said, judging from present indications, the proposition is likely to result in the creation of such an organization. Mr. C. M. Keller, Secretary of the Columbus (Ind.) Gas Light Company, is now engaged in a correspondence with the Indiana fraternity on the subject, and we would urgently request those so addressed to forward him their views in the premises without delay—be they favorable or otherwise disposed towards the project. Mr. Keller seems to think that the suggested Indiana organization should be actively fostered and abetted by the executive officers of the gas companies, who, in his opinion, are the ones to be benefited most by its determinations. Our views on the question or policy of the formation of State Associations are too well known to require reavowal here; and we sincerely hope that Mr. Keller's efforts will be crowned with complete success. If the Indiana Association becomes an accomplished fact, we would, however, suggest to those who will be entrusted with the duty of preparing its constitution that an article should be inserted to restrict the active membership—*i. e.*, those who shall have the right to vote on all questions pertaining to the management and shaping of the policy of the Association—to persons who are actually connected with a gas works. Room on its rolls may be easily made for those who, while not being owners, directors, or engineers of plants, are still interested in one way or another in the development of the gas business, by the creation of what might for convenience be here termed a class of associate members. At any rate, we hope the Indiana fraternity will lose no time in communicating with Mr. Keller in relation to the subject above mentioned.

A Proposed Ohio Legislative Jewel.

Cable is the name of an Ohio senator who is responsible for presenting the following to the favorable notice of his brother legislators. It may be said that, for pure, unadulterated gall, it beats the legislative record—a record by no means slow at that.

"Section 6860c. If any officer, agent, or employee of any gas company, incorporated under the laws of Ohio, make a false return of the amount of gas burned by any consumer during any month; and if, on his return, any officer of any such company make out a bill for any amount of gas so returned, the presentation of such a bill to any consumer shall be considered as fraudulent, and the agent or person making the return, and the officer or agent making out or presenting such bill, shall be fined not less than five hundred dollars, and imprisoned in the county jail not less than sixty days, or both; provided, further, that if any gas company, at any time, for more than two days in succession, fail to furnish merchantable gas, as provided by Section 3557 of the Revised Statutes, the President, or any member of the Board of Directors of said company, or each of said officers individually, shall be fined two hundred dollars for each offense, and imprisoned in the county jail for sixty days, or both."

Up to our last advices, the bill had been read the second time, and referred to the Committee on Corporations other than municipal. It might also be said that sundry amendments agreed to have robbed it of its venom.

Postponed.—Publication of an interesting item in relation to street lighting matters at Michigan City, Ind., must be delayed until next issue.

[Official Report—Continued from page 161.]

Sixteenth Annual Meeting of the New England Association of Gas Engineers.

Held at the Narragansett Hotel, Providence, R. I., Feb. 17 and 18.

First Day—Afternoon Session.

The Chairman here introduced Mr. W. A. Stedman, of Newport, R. I., who read the following paper on the

CONSTRUCTION AND COST OF A GASHOLDER TANK.

Experience in building holders comes slowly to the average gas engineer. In a gas works where the increase of consumption is moderate, and can be forecast with tolerable certainty, the "new holder" is built to cover a growth of ten or fifteen years at least; and very likely by the time the increased capacity has been grown up to some improved methods of construction (or at least plausible variations from old standards) have offered themselves to his decision. There are so many reputable firms now engaged (some exclusively) in the manufacture of gasholders that the operating gas engineer has no call whatever to exercise his skill in calculating the strength or in designing or draughting a gasholder. He can have, without charge, all necessary plans and specifications submitted in competition for his approval; and to their consideration, and the selection of what seems most desirable under the conditions peculiar to his own location and needs, he brings whatever of native or acquired judgment he happens to be endowed with. According as his mental temperament is conservative or progressive, will he incline to old-established methods or champion the new ideas, which offer advantages, perhaps, in economy or increased strength and durability. Let him not make the mistake of endeavoring to confine contractors to his own whims or notions, acquired from studying treatises, or from more or less accurate observation. He can see examples of widely varying constructions within a day's travel; and to determine which he will choose, and who shall build it, is about the extent of the demand upon his ability. Mind, I am speaking of the average gas engineer whom I mentioned at first.

In excavating the pit and constructing the tank the faculties of judgment and calculation have full play. A gasholder is a structure of iron, and every step of its preparation and building is a matter of predetermination, as much so as the cutting and making a garment. But a hole in the ground of large dimensions has elements of uncertainty about it, that give to its excavation somewhat of the zest with which the fisherman sets out on his expedition, in happy ignorance as to whether his venture will bring him success or only the traditional luck of his tribe. If you have made a careful estimate of the cost of excavation, it is a matter of constant and vivid interest, at each step of the descent, to note how far the character of the material varies from what you had expected to find, and consequently how great the disparity between your estimated expense and the actual cash outlay—too prone, alas, to overrun.

As in our Association the experience of one is the property of all, I defer to the demand of our Secretary for an account of the construction of our new holder and tank. I cannot hope to make a very interesting paper on this subject; and if I had had more time to consider excuses I should not have written it at all.

We bored five holes on the site selected, and ascertained that there were clay, plumbago, and rock of mixed character, in the order named from the surface down. Digging began on Monday, Dec. 31, 1883. This was turning over a new leaf, on the day before the one generally prescribed for that operation. The day was selected to propitiate luck. The man who was to be foreman of the digging was certain that there was no day like Monday to begin a job. I am sorry I cannot speak positively as to whether the event justified his superstition on that score; but I can, however, conscientiously state that my experience with that foreman compelled the conclusion that any day of the seven would be unlucky to the employer who engaged him on that day.

On the day of beginning there was no frost in the ground. We ploughed the surface and ran the soil off about the sides to use in raising the grade around the wall. The surface at the lowest edge of the circle struck was six feet lower than at the east; and, as we proposed to have the completed tank wall three feet above grade at the east side, the opposite point in the wall would be nine feet above the surface.

From the tank to tidewater was a distance of 150 feet; and there was a descent of 7 feet to high-water mark. The material excavated, after reserving for our grades, was used for filling the area behind the wall, which we constructed as a wharf front. When we began to send down to the water dump we used two trains of three cars each, and the necessary tracks and switches. We used the hoisting engine which was to do duty at the coal hoist later on, and with this we brought the cars out with an impetus which sent them to the dump, whence they were returned by horse power. In this way the cost of moving the earth was but little more than the picking and shoveling into the cars; and the cost of excavation to the depth of 11 feet was but 34.2 cents per cubic yard.

Below this rock began to appear, and we soon struck three different ledges, lying north and south, all with a sharp dip toward the water. On the west the rock was of a granitic nature, but with many variations and infinite seams. Neither powder nor dynamite had much effect to shake it up, as the natural vents to the energy of the explosive frequently left the rock almost unharmed from the force of the heaviest charges we dared use. Wedges and bars were the most effective tools, and after long prying in one spot we would frequently loosen the key to quite a mass of stone, which would be lifted thereafter quite easily. However, this ledge was very refractory, and cost us heavily in money and effort.

The central ledge was of a soft, slaty nature at first, growing harder toward the bottom. The eastern ledge was a slate of much harder character, with a tendency to cleave into long, thin leaves, and readily shaken by blasting. The main trouble experienced with this was its persistent tendency to slide in upon us; for its dip was such that we could but undermine in cutting the walls perpendicularly, and now and then great masses of rock would come tumbling in upon us. I ought to have mentioned that the clay above the rocks was such that it could be depended on not to cave; and so no shoring was used at any part of the sides. But when the underlying rock came in, the clay above was bound to follow; and so, by the time we had reached bottom, we had a tank of extremely ragged sides.

The bottom was leveled for a space of 6 feet all round the outside, and a cone 12 feet high was left in the center. The cost of removing the material of all kinds was 86.7 cents per yard. The original estimate—allowing the tank to be of just the requisite diameter, viz., 104′ 6″, and 116′ at top (we struck this at top to give slope on the earth part as a guard to caving)—was 7,300 yards to be removed. But the raggedness of the rocks, and the slipping tendency of a part of it, together with the freezing and thawing of the sides above the rock, which threw off the clay in considerable quantities, caused us to take out about 700 yards in excess of the estimate, or about 8,000 yards altogether.

For building the walls we were fortunate to secure the services of a conscientiously careful and painstaking man, whose only disagreement with me was that he wanted to build stronger than I thought necessary. His experience had been quite extensive in tank building, and always with walls of great thickness. I argued that 16 inches of well-laid brickwork would be of ample strength, backed as it would be by grouting behind it against the solid rock, and puddling above the rock by the heavy clay. But he seemed loth to risk his reputation on a wall for a 100-foot tank whose thinness no precedent justified. I then conceded a 20-inch wall at the bottom, to extend 16 feet up, and the balance 16 inches. He begged for another brick, and finally carried his point. He had the advantage of me in matter of experience; and while he quoted numerous walls of 3 feet, I could only recall one of my own building, and that was a 70-foot tank, 24 feet deep, which was always tight and sound, built with 20-inch wall for 12 feet, and 16-inch wall for 12 feet, and in soil and rock quite similar to that described above.

So the walls were built 24 inches for 16 feet, and 20 inches for 10 ft. 9 in. The outer eight inches of wall was always kept highest, and always thoroughly plastered before the inner courses were put on. The next eight inches was plastered in the same way; and the wall when finished plastered again on its interior surface to within 6 feet of the top. Above this line the bricks were left bare. The rocks which tumbled in upon us toward the last of the digging had been piled up on the cone, and as the building progressed these were broken up, thrown behind the wall, and thoroughly grouted in. The ragged places were thus perfectly and certainly filled, and afforded the wall an unyielding backing. When these stones gave out, and the cavities behind the brickwork were larger, we began puddling in the clay. At six feet from the top we built in an iron band $4'' \times \frac{3}{8}''$, and at three feet higher put in another of the same strength. The buttresses (ten in number) to support the columns were started by corbeling out six feet below the top, and the anchor bolts were built in these, as usual. A slate stone coping, 4 inches thick, capped the walls.

The bottom, from the nature of the rocks, was terribly ragged and irregular. We had determined on an 8-inch covering of concrete; and to get about this thickness all over we used screeds 8 inches wide, and filled in the deep places with large stones well grouted. The concrete was—cement, one part; sand, two parts; and small crushed granite stones, four parts. This was a small proportion of stones; but here my objections were overruled again.

On this bottom the holder was built, resting on 20 landing stones 6 inches above the surface. After the holder was complete and the staging all removed, a coat (one-half inch thick) of Portland cement and sand—equal volumes—was plastered over the entire bottom. My thoroughgoing mason had a long and strong argument with me about the necessity of paving the bottom with two courses of brick; but I was adamant on this point. He offered to compromise finally on one course; but I would not yield. He

then sorrowfully washed his hands of all responsibility for that bottom, and gave me up to the consequences of my rash and persistent obstinacy.

Water was constantly with us, and still not very troublesome. We managed it at first with an ejector—drawing through a 1¼-inch pipe. After getting to the rock we had more water and a greater lift, and used a No. 3 Knowles pump. We drained all the water into the well-hole, where the inlet and outlet pipes were to be adjusted; and when these pipes had been placed we put a 4-inch cast iron drip pot in the well, and connected (by a 4-inch cast iron pipe) with the interior of the tank. This pipe, as well as the large pipes, was built solidly into the wall; and the suction pipe from the drip pot rose to the top of the ground, thus allowing the pipe well to be filled as the walls went up. Just inside the walls was a drain, in which we laid a common land tile, and filled around it with chip stones, taking care to avoid ramming the concrete into this drain. A half-dozen holes were left in the concrete to carry away any water which might gather in the tank, until the coat of Portland cement was put on; and then these holes were filled. Of course the pump was now assiduously kept moving; for just at this finish a small accumulation of water allowed below the concrete would be fatal to the integrity of the bottom.

About an hour after the last cement was down a 4-inch stream of water was let in, and kept running till the tank was full to the overflow pipe. We never could discover that the water settled at all. During the next month (August) we had several showers, and any slight evaporation was compensated for; but frequent and anxious observation could not detect the water line at any time one-half inch below the overflow.

The holder was built by Messrs. Deily & Fowler, of Phila., Pa., and was eminently creditable to them. It was as tight as the tank, and has worked from first filling to the present time in the most satisfactory manner. It has recently, when quite full, withstood a full exposure to the severest gale experienced in Newport since 1869. It is a non-trussed, flat-top holder; has 10 wrought iron columns, and 20 guide wheels at bottom; and the top lands on a center pier built four inches above the level of the walls. When the holder lands the top is still supported by the gas as long as gas remains in the other holders connected with it. Should the gas be let out entirely, the top would land on the pier; and the crown, from its center to its circumference, would have a slight downward curve.

The holder is 100 × 26, and has a working capacity of about 200,000 cubic feet; it gives a pressure of about thirty-one tenths. My experience with this confirms my partiality for non-trussed holders, as the ordinary trussing and bracing is of but little use; and the weight of it in the sheets certainly adds to the strength where it is most needed, and increases the durability of the holder.

Cost of Construction.

Excavating tank	$6,937 49
1,466 bbls. cement	1,909 31
Sand	619 35
Stone for concrete and crushing	527 00
376,000 bricks, at $9.50	3,573 00
Masons and tenders, laying brick and concrete	2,931 00
Other labor, puddling and banking	2,486 24
Stone coping	585 55
Pipes, valves, and fittings	604 50
Total	$20,173 44

Mr. Stiness here asked Mr. Stedman whether, without that ledge of rocks, he would be willing to risk the chances with a wall only 24 inches at the base. Mr. Stedman replied that he thought so, if he had the right quality of clay behind it. The clay encountered was so solid that he did not think the wall could be forced if the puddling behind was properly seen to. He (Mr. Stedman) would certainly have risked it if the sides of the excavation were all in clay of the description spoken of.

The President said they had listened to an interesting and instructive account of tank work construction, and hoped the other gentlemen present who had experience in the premises would recount it. In view of the fact that Mr. Slater, of Providence, R. I., had contributed a paper on the identical topic treated of by Mr. Stedman, he (the President) thought it might be well to listen to Mr. Slater's paper, so that both might be discussed together. This course was pursued. Mr. Slater thereupon read his paper, entitled—

NOTES ON THE CONSTRUCTION OF A GASHOLDER TANK.

The quantity of gas that can be stored as compared with the quantity sent out during the 24 hours is a subject which almost constantly engages the attention of the careful gas manager. Even the superintendent of a small gas works (one nearly all of whose consumers are located either in stores or private dwellings) is often called upon to exercise his ingenuity in order to keep up his supply of gas; more especially if his storage capacity is small as compared with his sendout—for a few days of dark or stormy weather, at certain seasons of the year, will oblige his consumers to use larger quantities of gas than they would require in clear weather, and thus so reduce his stock on hand that his supply may fall short of the demands of his patrons. The amount sent out by different companies sometimes varies to the extent of 50 per cent.—by reason of dark weather, or other cause—so that, without ample storage capacity, a greater number of retorts must be kept under fire than is necessary during the periods of average or normal daily consumption. So, also, is it the case with the larger companies, or those whose sendout amounts to several millions cubic feet per diem. In these latter it is no uncommon thing to see from five to ten benches kept under fire as a reserve in case of necessity. For these extra benches a certain number of men is necessary; and these men must be paid even though they cannot be kept busy.

A little consideration of these facts will show that the most economical working is secured when the storage capacity is ample. Then the superintendent can keep under fire a certain number of retorts, and employ that number of men for whom almost constant duty may be provided. It then becomes evident that the manager who delays until the last moment the enlargement of his storage capacity, runs much risk of allowing his consumers to be without a full supply of gas; and from the fact that he must bank his fires when his holders are full, and stop his works—which necessitates a condition that permits of greater damage to his retorts than is the case when they are kept constantly at their proper duty—his men are partially idle, and his cost for labor per thousand feet of gas made becomes out of proportion to what it should be, or what it would be, in case the benches and retorts were kept constantly employed. On the other hand, we sometimes hear a manager say that his sendout is greater than his storage capacity. Such management cannot be considered prudent or wise; for it involves a risk which no careful gas manager desires or cares to assume. Just where the limit of risk ends, and where real necessity for increased storage begins, is a question the settlement of which must be governed by the circumstances and conditions which obtain with each individual. Some engineers consider that a surplus storage capacity of 50 per cent. is none too great; and it cannot be doubted that any active manager of a gas works will feel safer and sleep better at night when he has that limit than when his storage capacity is barely more than equal to his sendout.

The necessity for additional storage being decided upon, the next question arises, "Where shall a holder be located?" This question must often be decided upon from circumstances. The location of the works, the size of the mains, the distance from the works of the district wherein the largest consumption takes place, the fact as to whether the company owns land near the works on which to locate a holder—or, if not, whether it can be obtained by purchase, are all questions which must influence the decision as to holder location.

In the construction of new works, wise management would seem to dictate that sufficient land be secured, not only for present but also for prospective use. That being the case, probably most engineers would decide at once that the best place for locating a new, or, in fact, all the holders, is at the works. But with a company whose works have been in operation many years, and whose business has outgrown the original plant, and where wise forethought had not been exercised in securing additional land for future use, it often becomes a necessity to place a new holder in a locality more or less distant from the old site, even though it entails, as a reason of its distant location, an extra expense upon the company for ever afterwards.

The location being fixed, the next question is, "What is the condition of the soil or earth to a depth at which the excavation must be made for the tank, and also what foundation can be had for the tank walls?"

The company with which I have the honor to be connected having erected a new triple-lift holder during the last season, I will endeavor to give you a description of the construction of the tank, as also some of the details of its cost.

In the first place, the area of the lot at the west station (which was selected as the location of the holder) was limited—it being between two streets, and of an elongated V-shape. As it was desirable to obtain as much additional storage as possible, it was decided to build a triple-lift holder, the tank for which would be 110′ inside diameter, and 29′ deep. The next thing was to ascertain the nature of the ground; and for this purpose six holes were bored at about equal distances around the circumference of the circle, as nearly as possible where the tank walls would come.

Samples of the earth taken from these holes were preserved, and they showed from 11 to 12 feet of sandy soil, intermixed with more or less gravel—the lower portion being sand, mud and water. The next 10 to 14 feet was a mixture of dock mud and clay, underneath which was a stratum of coarse gravel, some 4 to 5 feet thick; underneath the gravel was blue clay.

Considering the nature of the ground, it was at once decided that the excavation must be protected by sheet piling; and also that the foundation of the tank wall must be laid on the stratum of gravel.

The plans and drawings for the excavation were designed and furnished by the contractor for the iron work, Mr. T. F. Rowland, of the Continental Iron Works, Greenpoint, N. Y.

The work of excavating was commenced on the 13th day of May, last. We first took out, to a depth of about 7 feet, the whole area of the tank, and also to where the outer circle of sheeting would come, leaving the bank sloped back from the outer line of sheeting to angle of 37° from the perpendicular. On the side where the 20" inlet and outlet pipes were to be placed, the outer line of sheeting was extended, and the inner line fl ttened from the circle, thus giving room to put in the inlet and outlet pipes without disturbing the sheeting. Outside of the outer circle of sheeting, opposite the inlet and outlet pipes, the sheeting formed a well 9′ 6″ × 12′, in which, after the excavation had reached its depth, a brick well was built, and into it was led the necessary connecting pipe to conduct the water from the tank. In a suitable position in the well a large steam pump was placed. That pump, being run night and day, kept the excavation and tank free from water.

The sheet piling was made of 3″ spruce plank, about 9″ wide and 20′ long; against which were placed four lines of rangers, each composed of three layers of 3″ plank, 12″ wide, with the end joints properly broken. These rangers in turn were braced with 8″ × 10″ timbers, so arranged as to clear the tank guide-rails when placed in position. These braces were placed about 7′ centers, horizontally; and were 12′ to 13′ long.

The radius of the inner line of sheeting was 47′, and of the outer circle, 61′ 6″. After the 7′ in depth had been removed, both lines of sheeting were started, and the entire annular space between the lines was excavated by shoveling the earth upon platforms made of plank placed upon the braces—the footing of the sheeting being kept well down as the excavation proceeded. The whole inner surface remained undisturbed, so as to sustain the inner line of sheeting until the walls were nearly completed. The pump was kept at work, day and night, until the tank was completed and partly filled with water. In driving the sheeting great care was taken to keep each plank plumb and in line. The work progressed favorably until July 14th, when the excavation was so far completed that the task of laying the foundation for the walls was commenced. This foundation was made of concrete composed of one barrel of Norton cement, one barrel of sharp sand—these being thoroughly mixed dry, then thoroughly mixed with water—four barrels of coarse screened gravel were added, and the whole intimately mixed together. The concrete foundation was laid about 14′ 6″ wide, and 18″ deep. Temporary sheeting across the annular space formed by the two main lines of sheeting was used while the excavation was being made for the drips (which were also on a concrete foundation), and placing the inlet and outlet pipes. On the 20th day of July the first bricks were laid in the walls. The bricks used were furnished by Messrs. Sayre & Fisher, of Newark, N.J. They were hard and well burned, and were very uniform in quality.

The cement mortar was made of two parts Norton cement to three parts sharp sand. The walls were started on the concrete foundation at 48″ thick—the bricks being laid as closely as possible, and the joints all well filled. At a point 8′ 1½″ from the bottom, on the outside of the wall, an offset of 4″ was made; and 7′ above the first one another offset of 4″ occurred, the balance of the wall, almost to the coping, being 40″ thick. The piers for the columns of the holder were started at the lower offset in wall, 5′ wide, and gain their full thickness at 10′ 1½″ from the bottom of wall, and continue plumb to the bottom of the coping, making thickness of the wall through the pilaster equal 56″. The base stones for the columns were 5′ 2″ × 4′ 9″, and 12″ thick. The intermediate coping is 37″ wide, and 10″ thick, all granite.

There are also 32 granite landing stones, each 3′ 6″ long, 12″ wide, and 10″ thick. The cap stone for the king post was of granite, 4′ × 4′ square, and 12″ thick. The tank is 29′ deep, the bottom being cone-shaped, with a rise of 10′ 9″ in the center. The cone is covered with concrete 12″ thick, and over the concrete is a coat of Portland cement, 1½″ thick.

Before the concrete foundation was put on a 6″ drain tile was laid inside the line of the wal', also another outside of the wall, extending into a 12″ cast iron pipe running into the well from which the water was pumped. In the bottom of the well small stones and coarse gravel were placed, and in pumping care was exercised not to undermine the work, or to displace any soft material in the adjacent ground.

The tank proper was practically completed about the middle of September, 1885. The first column was placed in position on the 11th of September, and the entire work was so far completed, on the 28th of Nov., that the tank was filled with water preparatory to testing the holder.

The cost of the tank was as follows:

Excavating.

Labor	$6,052 13	
Teaming	1,968 32	
Lumber	1,783 49	
Pumping	859 34	
		$10,663 28
Carried forward		$10,663 28

Brought forward		$10,663 28
Construction.		
870,000 bricks	6,090 00	
2,928 barrels Norton Cement	3,191 52	
153 barrels Portland cement	406 50	
Coping, landing stones, etc	1,512 80	
Lumber	131 85	
Water	160 00	
Sand and gravel	951 00	
Drain tile	78 44	
Labor, masons, etc	7,221 63	
Teaming	406 75	
		$20,150 49
Sundries.		
Watchman	445 04	
Valves	225 51	
Iron shoes for sheeting	117 54	
Rubber boots	80 70	
Shovels, etc	51 35	
Mauls	30 00	
Sundries	605 63	
		$1,555 77
Superintendence		1,185 00
Net cost of tank proper		$33,554 54

When the wall was brought up to the street grade the space outside it was filled with selected material, thoroughly puddled in and made compact and solid. Between the streets it was decided to bank up earth against the tank. For the purpose of holding the bank on the street side a brick retaining wall, some 80′ long, 32″ thick at the bottom, and 20″ thick at the top, was built on a concrete foundation (well below frost line, and about 6½′ above the grade of the street) and capped with blue stone—the top of which was on a level with the top of the coping of the tank. The construction of the tank was under the immediate superintendence of Mr. Andrew J. Anthony, of Providence, R. I. The masonry—from the commencement, during its progress, and when finally completed—was conceded by every one who saw it to be a model piece of work in every way; but what was our surprise, on the 28th of November, when the water had reached a height 1½″ below the overflow, to find the tank and retaining wall had cracked, and the water was running out.

The opening in the joint of coping, next to the base stone of one of the columns where the crack appeared, was about seven-sixteenths of an inch wide; but at the same time a line drawn from end to end of the retaining wall did not show the slightest outward movement.

Neither did the face of the coping vary, except simply the opening. The water was at once shut off from the hydrant out of which the tank was being filled; syphons were put in, and the water was drawn down to the grade line, after which it leaked away through the crack some three feet further, where it practically stopped. Mr. C. L. Rowland, of the Continental Works, came to Providence at once; and, after examination, advised that an iron band, 4½′ wide by about ⅜ of an inch thick, be shrunk on around the whole tank. This was done, as soon as practicable, by Mr. Rowland and his assistants. The outer section of the holder was raised and moved over so as to admit of a coffer dam, which was placed in the tank; and an examination disclosed the fact that the crack in the wall extended nearly to the tank bottom. The coffer dam being placed in position, the tank was again filled with water; two courses of brick on the face of tank wall were cut out, and rebuilt with Portland cement.

In shrinking on the iron band the crack was partially closed, and the balance of the opening, as far as possible, was filled with cement grout, under pressure.

Portions of the retaining walls adjoining the tank were removed for the purpose of placing the band in position. On the side where the break occurred the wall was taken down clear to the foundation and rebuilt on both sides.

On the 28th of December, or just one month from the time the break occurred, the tank was again replenished with water. The holder was tested and found to work admirably—the three sections working practically level. The air which was used in testing was at once displaced, and the holder was filled with gas. Since then the tank has shown no signs of leakage, and the holder has performed its duty in the very best possible manner.

Discussion.

The President—You now see the difference between building a tank in a soil composed of clay, where you only need a 16 or 20-inch wall to make it perfectly tight, and building in a soil chiefly composed of gravel, where you

need a 40-inch wall at the bottom. I think Mr. Slater's experience has been extremely interesting; and the fact that you can close up a leak in a wall by shrinking on an iron band (as you would a tire on a wheel) is an extremely valuable thing to know. I wish that the other gentlemen who have been unfortunate in their tank construction would give us the benefit of their experience As far as we are concerned, more than a year since we built a tank with great care in gravel foundation, where, in spite of the care exercised, a small portion of gravel was pumped out underneath, with the consequent settling of a portion of the concrete and a leak under the tank wall, which was only remedied with a good deal of trouble. I do not think that the tank is entirely tight as yet.

Mr. Allyn—I think it would be interesting to the members if Mr. Slater explained how the iron band was shrunk on the tank.

Mr. Slater—The band was made in four sections. Around the four corners of tank an angle iron was put on with bolts to take it up. The band was put on cold, and the bolts were screwed up tight. Afterwards the iron was expanded through being heated by means of wood fires. When heated the bolts were taken up again, and the band was allowed to cool.

The President—Were all four sections heated at once.

Mr. Slater—Yes.

The President—Throughout their entire length; or in the middle?

Mr. Slater—Between each of the columns. There are 16 columns around the holder.

The President—Then each band was heated in several places?

Mr. Slater—Yes; but it was nearly continuous. The fires were started between the two columns and as near to the columns as possible.

Mr. Rollins—Has Mr. Slater traced out the reason why the crack in tank occurred?

Mr. Slater—No; that has not yet been decided. The question is now under investigation.

Mr. Coggshall—Did Mr. Slater say that the brickwork at fracture was cut out and replaced by new material?

Mr. Slater—Two courses on inside face of wall were cut out. We placed a pipe on the coping, and put in the grouting under pressure.

Mr. Snow—The President having asked for the experience of those who were unfortunate in having a leaky tank, I may say that in 1884 we built a new holder at Holyoke. The soil in which the tank was located is sandy. We dug down until we struck water and quicksand. The depth of tank is 27 feet. The lower part of tank wall is 40 inches thick, and by set offs of four inches it decreases, from 40 inches at the bottom, to 20 inches at top. The method of laying the brick was as follows: The outside and inside courses were laid in cement; then a cement mortar, of the consistency of a thin mush, was poured in between, and bricks were laid thereon. The tank bottom is made of four courses of brick laid in the same manner, and in this mush-like cement. The inside diameter of tank is 89 feet. For the first day or two after letting the water in the tank was perfectly tight. In the course of two or three days, however, it commenced to lower at the rate of about one inch in 24 hours. We have been unable to determine whether the leak was at the bottom or in the sides; but the leakage has been gradually diminishing, until now the water will not lower over one-quarter or three-eighths of an inch per day. We expect that the leakage will eventually disappear.

The President—Did you put in anything to stop it?

Mr. Snow—We first put in dry manure (letting it get dry so that it would break up fine), distributing it equally all around the tank.

The President—What did you make the bottom of?

Mr. Snow—The bottom of the tank was made of four courses of brickwork laid in soft, mushy cement. We did not plank it at all.

Mr. Stiness—In 1870 (when I was building a tank), during a conversation between Mr. John P. Kennedy and myself, that gentleman said, "Let me give you a rule—never grout the wall of a gasholder tank." I believe that is as good advice to-day as it was then. I have built two within the past few years. They have been constructed under the direction of Mr. Anthony, who is the mason of the Providence (R. I.) Company. Both have been excavated, out of solid rock from top to bottom, to a depth of 27 feet. We did not do as our friend Stedman did—build a light wall; but we built the same as though we were to have sand or clay. We have two tanks that overflow in every rain storm. I think the remark of Mr. Kennedy should be taken into account by all gas men, because I have known of many tanks where the practice of grouting between the bricks has resulted in failure.

Mr. Nettleton—I would like to inquire what Mr. Stiness calls a grouted wall.

Mr. Stiness—What I take to be a grouted wall is this—laying up one course of bricks on the inside, then another course on the outside, and filling in with a sort of cement.

The President—Do you mean with bricks and cement, or with cement alone?

Mr. Stiness—Common cement, with sand and gravel. That will never make a tight wall. While I have never tried it, I know, from experience that has come to my knowledge, that gasholder tanks so built have always leaked.

The President—It is possible that Mr. Kennedy may not have referred to such soil as Mr. Snow constructed his tank in. His wall seems to have been good and tight after a gradual stopping up of the leak, or whatever it was. I think you have been fortunate in constructing your two tanks in tight stone work. It is quite possible that they might have been tight if you had not put any bricks in them.

Mr. Nettleton—With reference to what Mr. Stiness has said about grouted walls, I think we might all agree with Mr. Kennedy as a man of wide experience and of most excellent judgment, and one whose advice ought to be looked up to by us all. On the other hand, there is a man in New York who has probably built as many and as good tanks as Mr. Kennedy—I mean Mr. Farmer—and he has met with as good success in his work as Mr. Kennedy. In all his specifications he provides that the wall shall be grouted in the general way that Mr. Snow described. One of the tanks designed by him was built for the Derby Gas Light Company; and until within a month or two it has been practically tight. It was built in just the way that Mr. Snow has described. Before taking my seat I wish to move that a vote of thanks be tendered to Col. Stedman and to Mr. Slater for the instructive papers they have read; and I wish also to express my personal thanks to them for their kindness in preparing those papers. [Agreed to.]

Mr. Crafts—At Northampton, Mass., we built a tank similar to the one described. To my mind the great trouble in building a grouted tank is that the masons are very apt, after laying the two outside courses, to smooth over on the brick the courses of partially dried mortar that they may have been careless in placing where it should be put. Where it is not smoothed over, or where the gap left is left entirely open with the grouting so thin that it will just run, and the brick are pressed into it, and sweeping on top of it, it will answer. We had no trouble in laying outside courses, then following those with thin cement on the inside, then laying in brick, and then sweeping it around. A tank will leak invariably where they smooth over this cement, leaving holes in it. I was at Albany, N. Y., at the time they were laying the foundation of the Capitol building. The cement brought there was inspected as carefully as flour would have been. That which did not answer to the test was invariably rejected.

Mr. Thomas—I have had experience in tank building, and I have always grouted in the brickwork. It is about the only way in which to make a solid wall. I made a tank excavation through clay in Detroit, Mich., that would not leak before any brick work had been placed in it. In Virginia I put down a tank and made the excavation through a white beach sand. A tight job was made of it. Another example, sunk through shale, was put down in New Brunswick, N. J., and it was successful in every respect. At Jamaica, L. I., where a gravelly soil was encountered, I had greater trouble to make a tight tank than was experienced at College Point, L. I., where the tank excavation was sunk almost through water. To make a solid wall, have the same slushed—which is about the same as grouting—then, if the slushing is done properly, and the bricks are well rubbed in, you will have a tight tank. Frequently in tank building the courses of brick are run over from the inner to the outer face of the wall. I have seen specifications which provided that the tank walls were to have courses of headers. I do not believe in the "header" practice. To procure a good tank you should be particular to break every joint. In my experience at tank work I may say that I built two in New York city, one in New Brunswick, N. J., one in Norfolk, Va., one in Detroit, Mich., three in Williamsburgh, N. Y., one each in Jamaica, College Point, and Flushing, L. I. All of these are good tanks, and all were built under the "slushing," or, as Mr. Stiness calls it, under the "grouting" process.

Mr. Stiness—I think that "grouting" and "slushing" are different things.

Mr. Thomas—Not a bit of it. I do not believe in very thick tank walls. The heaviest tank wall that I ever built was forty inches at bottom. Usually they would top out at 20 and in some cases sixteen inches. Of course, it is the attention paid to laying the brick, breaking the joints, and the solid filling up of all the interstices, that makes a tight tank.

Mr. Harbison—On the subject of tank building, and of repairs to same, I may say that we have had some experience in our city. Some of our members know that at Hartford we have a rise and fall of 27 feet in the water level—from low to high water marks. Our works are situated on the banks of a stream that runs across the city; and we have one holder tank which is perhaps within ten feet of the retaining wall of the river bank. We built a tank there, some 15 or 18 years ago, and the nature of the soil (it is all filled in ground) made it all the more difficult to secure a permanent foundation. When the excavation was completed the bottom of the tank was within about three feet of the river bed. The walls (which were 22 feet in height) were about three feet thick at bottom, and two feet thick at top. On the very day the tank was filled the walls split from top to bottom, and a crack,

over three-quarters of an inch wide, appeared at the top. We at once emptied the tank, removed the filling from between the brick walls of tank and the stone retaining wall on river bank, then filled in, to within 12 inches of the brickwork, with dry stone, and rammed in grouting between the stone work and the brickwork. On being refilled the tank held water for a time; but the leakage reappeared soon afterward, and the walls again split. We cut out the cracked portion and rebuilt it in again; but it was far from cured. In fact the tank was in such a leaky condition that we could scarcely keep water enough in it to cup the holder. We emptied it once more, dug down to a depth of about 5 feet below the surface of the ground, and put on two iron bands, six inches wide and five-eighths of an inch thick. We then chipped off the entire inner surface of the wall, laid a course of bricks one-half inch out from the chipped brickwork, and filled in the space with cement grouting. We then shrunk on our iron bands, and filled the tank. It has been a tight tank ever since. We had used an immense quantity of dried horse manure, and poured in an innumerable number of barrels of tar, sawdust, and almost everything else, in the attempt to stop the leak, but were not successful until we tried the plan formerly described. In another case we laid a four-inch wall all around the tank, placing anchors in each two feet sections—the anchors reaching back of two courses of brick. Thus, in place of the customary 12-inch space between brick and iron work of the holder, we have less than that by one thickness of brick.

Mr. Prichard—At a recent meeting of the Guild of Gas Managers Mr. Slater propounded the conundrum—"Why did the tank crack?" I have thought considerable of it, and finally determined the answer to be this—and Mr. Harbison's experience goes to show that it is correct: It is a fact that almost every tank that cracks cracks vertically, the fracture being widest at the top. I took a cylinder (representing roughly a gasholder tank), set it in a bed of sand, filled it on the inside with sand, and packed sand around the outside. I then cut that in half, with a vertical seam on each side. Then, by inserting my finger in the sand, I could produce a pressure. I supposed that the pressure, being greatest at the bottom of the tank, would push it apart there; but instead the top flew out—it cracked just as holder tanks crack. The crack was widest at top and narrowest at bottom. That result occurred every time. As long as the pressure on the inside was greater than that on the outside it spread open at the top. I found that we could consider the pressure (although greatest at the bottom) as acting at one point, which would be one-third the height from the bottom. This pressure acting there would part the halves from each other, providing the tenacity of the wall and the backing was not sufficiently strong to withstand it. My theory is that in either case, and in Mr. Harbison's case particularly, it was backed with made land, composed, say, of gas works ashes and material that would compress easily. You can see that an opening of three-quarters of an inch in a tank over 100 feet in diameter would have to move the backing an exceedingly small amount. This theory is sustained again by the fact that the shrinking on of the bands (thereby increasing the strength at the top) stopped it. I think, undoubtedly, had those bands been built in the tank wall at the beginning (as is sometimes done now) it would not have cracked. If the tenacity of the walls had been strengthened by bands of iron, and by sufficient backing, they could not have cracked in that way. The solution may or may not be right; and I only offer it as my contribution to the explanation of the difficulty.

Mr. Stedman—I believe the prosecution always has the right to sum up. It seems to me that what we are to learn from the discussion, and from the papers, is this: Every gas engineer must decide for himself just what strength of wall he requires in the soil he is excavating. If the soil is porous (and sometimes a gravelly soil is the hardest in which to construct a tank—it being more porous than a sandy soil), a stronger wall is certainly required than is the case in a soil impervious to water, and which can be settled together very solidly indeed. I think that a good clay backing to a wall is as strong as anything it can have, without regard to its imperviousness to water—it being able in itself to prevent water from leaking through a wall. For solidity of backing I would as soon have clay as rock. I think we have not been justified in building the walls as solidly as we have built them—doing so merely out of regard for precedent, and because we did not care to take the responsibility of any risk by building them too light. In a sandy soil I think that one is justified in building a very solid wall indeed. The pressure of water is something enormous. You must trust, in great measure, to the backing for strength; for if you do not have a good, solid, substantial backing, the walls will crack. I think that the porosity of the wall must be guarded against by the application of cement. I am inclined to believe that the grouting process would be a pretty good surety against water leaking through bricks. We know that bricks do not hold water. We must rely upon the cement to do that. I have a filter made of bricks for the purpose of running water through it. The water has been running through it for a couple of years, and the bricks have not become tight in all that time—although they might have become so if the water had been very foul. I do not see any fault that can be found with the method of construction which has been described—that of laying up one or two courses of bricks, and then plastering them over. You certainly have there a good solid film, and you make it as thick or as thin as you like, provided you have it thin enough to be free from checks and cracks. You then have a good substantial film of cement and sand. If you have a good cement, and good sharp sand, you are pretty sure, even with one well-made course of it, to retain the water in the tank. Then if, in addition to that, you have an additional wall or two in the cement, from the bottom to the top, you are quite sure to have a pretty dry tank, at least as far as the porosity of the bricks is concerned. Our mason thought that the bricks would absorb a good deal of water; and I dare say that a good deal of water would have percolated through the bricks if it had not been for the cement. A good deal of the shrinkage in the tank water can be accounted for by the sponge-like action of the bricks on the liquid. Where bricks are fortified by a coating of cement, that may not be regarded at all. It has often been insisted that a paving of one or two courses of bricks on the bottom was necessary to insure a tight tank. It is not necessary, provided you have a solid bottom. I can conceive that a paving of bricks would be an admirable thing if you had a bottom which was somewhat insecure. Then if you put three or four courses in the bottom you would have a sort of inverted arch against which the water might press without breaking out; but where the bottom is solid (as was the case with us at Newport) no occasion arises for the use of bricks, because they do not add to the tightness of the work; they simply add to the thickness, and also to the expense. You can depend that good concrete, well made and well rammed in, will be impervious to water. We took extra precaution to put on a coating of Portland cement, which made it absolutely tight. I do not think it possible to construct a tank which could be tighter than ours is, because I once had occasion to remark I thought the condensation of fog from the harbor would, during any night, overrun it before morning. That was received with some appearance of incredulity, and so I did not repeat it in my paper; but, as I said before, I think it is wise to consider the condition of the soil, and adapt your work in absolute accordance. The experience we have had here this afternoon may possibly be of more benefit than I thought it would be when I began to read my paper. As we are all liable to build a tank at any time, some of the younger members of the profession may possibly profit by this experience.

Mr. Coggshall, of Fitchburg, Mass., then explained the difficulties experienced by him some four years ago when building a tank at the Fitchburg works. The tank was 22 feet in depth, and during the excavation three different soils were struck—gravely, clay, and a mixture of gravel and sand. Water was met with in abundance, and a 3-inch pump was employed to keep it down. The bottom, for about two-thirds of its area, was pierced with springs. Drains were run to a well in center, and this well was connected with another well on the outside. In the poor or loose spots in face of excavation the walls were built 40 inches thick—at top they were 34 inches—and external piers were also carried up. A carefully mixed cement slushing was put in between the inside and outside courses. Despite the nature of the soil, and abundance of water encountered, the tank proved to be a good one.

The President—The summing up of the whole thing seems to be that we must, under different circumstances, act differently. No possible rule can be laid down here for the construction of tanks, which shall apply in all cases and without variation. We have at our works one tank which proved so incorrigible that we had to put an iron tank inside of it, and grout out between that tank and the outside wall before it could be made tight. That was built on a wharf—which is not a place where I would recommend the construction of a tank.

[To be continued.]

[Official Report.]

Second Annual Meeting of the Ohio Gas Light Association.

Held at the Arcade Hotel, Springfield, Ohio, Mar. 17 and 18, 1885.

First Day—Afternoon Session—March 17.

The members were called to order by the President, Gen. Andrew Hickenlooper, of Cincinnati, Ohio, at 2 P.M. of Wednesday, March 17. On motion, the reading of minutes of last annual meeting was dispensed with, the same having been published in the American Gas Light Journal.

On motion of Mr. E. McMillin, the members of kindred associations who were visiting in Springfield were invited to attend and participate in the proceedings. Inquiry developed the presence of Mr. Jas. Somerville (President of the Western Gas Association), and that gentleman was introduced to the members and welcomed to the convention.

Membership Applications.

Applications for membership were received from the following:

Bates, T. A., Circleville.
Gibson, W. S., Lima.
Graeff, G. W., Phila, Pa.
Hammond, A. W., Cadiz.

Kopp, A. C., Chillicothe.	Page, G. S., N. Y. City.
Padan, H., Portsmouth.	Perry, A. T., Cleveland.
Philipp, E. B., Findlay.	Sisson, F. A., Albany, N. Y.
Wood, P. J., Wilmington.	Walbridge, H. S., Toledo.

The names were reported upon favorably, and the Secretary was instructed to cast the ballot of the Association for their election. This being done, their names were enrolled.

ROLL CALL.

Roll call disclosed the presence of the following:

Anderson, J., Ironton.	Bowers, W. T., Hillsboro.
Bate, J. M., Tiffin.	Bushnell, A. S., Springfield.
Blinks, W., Michigan City, Ind.	Butterworth, I., Columbus.
Birch, T. H., Cincinnati.	Coverdale, R. T., Cincinnati.
Connelly, J. S., N. Y. City.	Cressler, A. D., Ft. Wayne, Ind.
Canby, R. H., Bellefontaine.	Dickey, R. R., Dayton.
Dell, J., St. Louis, Mo.	Dittmar, R. A., Troy.
Fabing, F., Fremont.	Fullager, J., Cincinnati.
Foley, T. W., London.	Green, R. P., Columbus.
Gwyn, E. C., Springfield.	Gemuender, M. A., Columbus.
Gwynn, J., Fostoria.	Harris, J. A., Phila., Pa.
Hickenlooper, A., Cincinnati.	Hamlin, E. W., Wilmington.
Kinsman, N., Springfield.	Lee, R., Piqua.
Light, J., Dayton.	McCann, J., Portsmouth.
McMillin, E., Columbus.	Prichard, W. W., Ironton.
Printz, E., Zanesville.	Phillips, J. H., Cincinnati.
Raynolds, J. A., Canton.	Robinson, A. B. Columbus.
Ranshaw, H., Cincinnati.	Reinmund, H. J., Lancaster.
Ross, W. A., Kenton.	Roots, D. T., Connersville, Ind.
Stacey, W., Cincinnati.	Stacey, F. A., Chillicothe.
Smallwood, J. B., Baltimore, Md.	Spinning, D. C., Dayton.
Stannard, A. B., Phila., Pa.	Walker, J. H., Jr., St. Louis, Mo.
Welch, C. H., Athens.	Wood, T., Sandusky.

PRESIDENT'S ADDRESS.

The President, Gen. A. Hickenlooper, then read the following address:

Gentlemen of the Ohio Gas Light Association:—The rapidly revolving wheel of time has added another to the eternity of years, and left behind the ineffaceable record of its successes and reverses, which, in this hour of retrospection, so vividly calls to mind the painful and pleasant recollections of opportunities lost or victories gained. While no great disaster has marked its course, the year that has past will be ever memorable as one of unusual interest and great anxiety to the members of our profession. But as we each, with more or less personal satisfaction, foot up the results of its teachings, let none be discouraged because the full measure of their brightest anticipations has not been realized; for the personal field of observation of each individual is limited to but a small portion of the territory affected by the unquestioned general growth and prosperity of our business, in which sooner or later we must all directly or indirectly share. It is, therefore, with peculiar satisfaction and pleasure I feel warranted in congratulating you upon the past results and future prospects of the industry in which we are all so deeply interested.

It is with sincere sorrow and regret I have to announce that, since our last annual meeting, three of our fellow-members have gone to "that country from whose bourn no traveler returns"—E. D. Moore, of Circleville; J. S. Thomas, of Wilmington; and Jos. M. McLean, of Washington Court House. I suggest the appointment of suitable committees to assist the Secretary in the preparation of appropriate memorials reciting the details of the professional services of deceased; and to express to the bereaved families of our deceased members the assurances of our heartfelt sympathy and regard.

Standing to-day amidst the confusion of noises and the busy, bustling scenes of this comparatively young but great and growing manufacturing center, scarce can we realize that, at a date not much more distant than the birthday of the youngest member present, in this city—then a village of but 5,000 inhabitants—was set free that spirit of enterprise which, as though in prophetic anticipation of its future growth, hesitated not to enter upon the still doubtful experiment of constructing a gas works. From the modest beginning of a $5,000 investment, and an authorized maximum charge of $6 per thousand, it has grown with the growth of the city, and prospered with the prosperity of its inhabitants, until it has enhanced its own invested values a hundred fold; is able to sell gas at the ordinarily considered unremunerative rate of $1.60 per thousand; and revels in the enjoyment of a per capita output equal to that of the largest city in the State.

Such unparalleled success comes not by chance, but is due to the liberal spirit, wise counsel, and judicious management of its controllers—a fit prototype of whom we find in the present "man at the helm," our distinguished associate Asa S. Bushnell, whose honored guests we are. Fortunate indeed is the city of Springfield in the possession of such a citizen; and fortunate are we in the possession of such a member. To him we are greatly indebted for a successful organization; and upon his tireless energy and matchless ability must we largely depend for the future prosperity of our association; An association which, though but a little over one year old, bears upon its rolls the names of representatives of more than three-fourths of the gas companies of the State, and embraces within its membership many gentlemen whose practical knowledge and scientific attainments will compare favorably with those of the most prominent and favorably known gas engineers of America.

Never before have such peculiarly discouraging conditions existed in this country; a superabundance of money, coupled with extreme stagnation of business and unparalleled fall in values, causing capital to abandon old and seek new channels of investment. Mainly to such existing conditions may properly be attributed the extraordinary and incomprehensible success which has for the past few years attended the efforts of promoters of patented "wind-and-water" processes in securing the investment of capital in their questionable enterprises. While there appears to have been no relaxation in their efforts to plunder and deceive, last year's developments and experiences indicate the beginning of the end; and, as if to hasten the downfall of their most infamous schemes, the United States Supreme Court, on the 7th of last December, rendered its decision in the New Orleans and Louisville cases—probably the most important which have ever been passed upon as affecting the gas interests of this country. The decisions in each are substantially the same, and establish the broad principle that the Legislative Acts which authorize the granting of an exclusive privilege are not liable to the objection that they are mere monopolies, preventing citizens from engaging in an ordinary pursuit of business, open upon terms of equality as a common right to all; but, on the contrary, that they are *franchises* which may properly be granted by the State, or a municipality acting under legislative authority, in consideration of the performance of a public service; and, after the performance of such service, become *contracts* protected by the tenth section of the Constitution. Mr. Justice Harlan, in delivering this opinion, refers to the Binghampton bridge case, in which Justice Davies said: "The wants of the public are often so imperative that a duty is imposed on the Government to provide for them; and as experience has proved that the State should not directly attempt to do this, it is necessary to confer upon others the faculty of doing what the sovereign power is unwilling to undertake. The Legislature, therefore, says to the public-spirited citizen, if you will embark, with your time, money, and skill, in an enterprise which will accommodate the public necessities, we will grant to you, for a limited period or in perpetuity, privileges that will justify the expenditure of your money and the employment of your time and skill. Such a grant is a contract with mutual considerations; and justice and good policy alike require that the protection of the law should be assured to it."

While it is not, therefore, within the power of legislative authority to enact any law or ordinance which will impair the rights and privileges of such an exclusive grant, it may still very properly enact laws which appear necessary for the proper regulation and control of the business, or to protect the health, morals, and safety, or other equally important interests of the community. Just how far this legislative control should be exercised is a debatable question; but it should certainly go to the extent of protecting the consumer against unreasonable exactions, and the companies in the undisturbed enjoyment of fair and reasonable profits upon their invested capital. Numerous attempts have been made to embody such leading principles in legislative acts, but, so far, without complete success. The recently enacted Massachusetts law is, in my opinion, far from perfect—in fact, a weaker, more unjust, and less satisfactory legislative enactment upon this subject I have never read; and I predict that, in the near future, it will prove a case of "jumping from the frying-pan into the fire."

Any State Commission should, as nearly as may be practicable, embrace a representative of each of the interests involved—of the State, of the companies, and of the municipalities; the first to be appointed by the Governor, the second to be selected by the gas companies of the State, and the municipality to be represented by its chief executive officer. The first should possess legal, scientific, and clerical ability of the very highest order; the second should be a gas engineer eminent in his profession. These two should be appointed for a period of not less than five years; be required to give their entire time and attention to the duties of the office; be paid a salary of not less than $8,000 per annum; should be furnished with a well appointed and thoroughly equipped department in the Capitol of the State—speaking for Ohio, the gas works at the Ohio Penitentiary should be placed under their exclusive charge for test and experimental purposes; and they should be at all times prepared to furnish accurate, detailed information in regard to the industry they represent. The chief executive of any city or town to be called upon to act as a member of such Commission whenever proposed action directly affects the interests of the municipality he represents.

Such Commission should first be required to make a thorough examination of the business and financial affairs of existing companies; and, from such examination, coupled with due consideration of the present and prospective

requirements of the business, fix and determine upon a fair and reasonable allowance of capital representing invested values, or necessary for properly conducting the business. With this as a basis, they should then definitely determine upon the divisible profits to be allowed upon authorized capital uniformly throughout the State. They should then prepare a bill expressing with great exactness the rights, duties, and obligations of both manufacturer and consumer; confining their own discretionary power to the narrowest possible limits, but investing them with ample authority to enforce an exact compliance with the law upon the part of municipalities, as well as corporations accepting under its provisions.

In the absence of general detailed information, and official statistics, it is impossible to even approximate to an indication of all the necessary details and provisions of such an act; but in general terms I would say that, under existing circumstances, companies now doing business in this State should be permitted to accept on a capital basis of ten ($10) per thousand cubic feet of sendout. That upon such authorized capital they should—after due and proper allowance for maintenance of plant—be permitted to make a divisible profit of eight per cent., and accumulate a reserve fund, at the rate of two per cent. per annum, until it amounts to a sum equal to 10 per cent. of the authorized capital; such reserve to be drawn upon only in case of unavoidable accidents, unexpected enhancement in the value of the materials used, great temporary depression in business, or other unlooked-for contingencies, that would render it impossible to earn in any one year the authorized dividend.

Whenever any company has secured the authorized reserve, and demonstrated its ability to earn the maximum dividend, it shall call upon the Commission to make an examination of its accounts; and, upon the basis of the last preceding year's receipts and expenditures, to fix and determine upon the price at which it shall thereafter sell gas to public and private consumers in order that they may realize the required profit. That it shall not, for a period of 25 years thereafter, be legal to charge more, or require such company to furnish gas at less than the price thus fixed and determined upon; but that, for the purpose of insuring the utmost economy in the manufacture and management, any company so electing may at any time reduce the price below that indicated, and, in consideration of such reduction, shall be permitted to increase their authorized annual dividends to the extent of 1 per cent. for each and every reduction of ten cents per thousand in the selling price. That existing gas companies should have a reasonable time, after the final passage of such a bill, within which to examine and consider its provisions; pending which examination no authority should be given for the establishment of additional companies.

Whenever any company officially signifies to such Commission its desire to accept under the provisions of such a bill, it should not thereafter be lawful to authorize the establishment of any other gas company within the territory occupied by such existing company. That such acceptance shall constitute a contract between the corporation and State, the terms and provisions of which should not thereafter be subject to amendment or appeal except by mutual consent. Such an arrangement would, in my opinion, prove eminently satisfactory to all concerned.

To a zealous search for new channels into which may be profitably poured the apparent abundance of surplus wealth may also be attributed the recent activity in the development and utilization of natural gas; the existence of which has been known since ancient authors wrote of the perpetual fires which burned on altars consecrated to gods, and used to inspire the superstitious multitudes with profound awe and reverence for sacerdotal authority. In fact, the birth of gas lighting may be traced back to the time when Mr. Shirley, over 200 years ago, called the attention of the Royal Society, of London, to a flow of natural gas in the Lancashire district. For half a century such wells have been known in this country; and for nearly a quarter of a century in the northern part of our own State. But it has been left to the business enterprise of the present day to develop and utilize that which has so singularly slumbered for years in the hidden recesses of its rock-bound prison.

The very highest geological authority of our State—Prof. Edward Orton—is of the opinion that we are not, as many have supposed, opening a vast and indestructible laboratory in which this gas is being constantly and continuously generated, but that we have simply tapped "pockets" or reservoirs created by the peculiar inclination or structural conditions of the oil-bearing rocks, and into which the gas has been slowly flowing and accumulating for untold ages; that the supply is most abundant where this disturbance is the greatest, and can only be found in the northern portions of the State; that it is everywhere limited in quantity, will gradually diminish in volume, and be finally exhausted within a very short period of time, say, not to exceed from five to ten years—views fully endorsed by Prof. J. P. Lesley, State Geologist of Pa. He thinks that the gas industry has nothing to fear from this new-born rival; but that upon the contrary it gives to the world a practical demonstration of the convenience and value of gaseous fuel, which will be of incalculable value in hastening the introduction of manufactured gas for domestic and industrial purposes. If his conclusions are correct, as to the limited supply, I cannot agree with him that the expenditures in contemplation, and now being made, for conduits are justified upon the grounds that after the supply of natural gas has been exhausted they can be utilized for the transportation, over such great distances, of fuel gas manufactured from the slack and refuse of our coal mines. But whether his conclusions are true or false, it will be but prudent for each, particularly those within the oil producing territory, to well consider the proper steps to be taken in order that they may promptly avail themselves of any advantages due to an unexpected "free blow."

Someone has well said that "you must look to your retort house for dividends;" and this being to a great extent true, the very rapid decline in the market value of residuals has been a source of no little anxiety to the prudent manager. Over production or reduced consumption, coupled with sharp and ruinous competition, has reduced the marketable value of our coal tar and its products at least 33 per cent.; but recently consummated arrangements upon the part of distillers to refrain from ruinous and destructive competition gives promise of better prices in the near future.

The most remarkable decline has been in the market value of sulphate which, without any well defined or assignable cause, has, within a period of five years, suffered a decline in market value fully one-half, rendering its future manufacture of doubtful expediency. This unfortunate condition of the sulphate market is somewhat compensated for by the constantly increasing demand for aqua ammonia to be used in artificial refrigeration.

In the matter of electric lighting there has been neither new nor startling development. While the "arc" has quietly settled down to the enjoyment of its best field—the expensive illumination of large areas—the "incandescent" has recently been making most vigorous efforts to share with us the broader field of interior illumination. Such contests have been mainly for the purpose of profitably disposing of "plants," and confined to the smaller cities and towns, where the gas companies were weak, prices were high, and consumption limited. Certain it is that the improvements made in electric lighting cannot compare with the advances made in the more perfect utilization of gas through the introduction of such improved burners as the Siemens, Lungren, Bower-Grimston, Wenham, Lipsey, Albo-Carbon, and last, but not least, the O'Neil—a recently invented burner which has not yet been placed upon the market, but which gives great promise of future success. The inventor had kindly consented to exhibit his lamp, and to prepare a paper explaining to our members the principles involved and advantages gained; but pressing business engagements will, I learn, prevent his presence. With such auxiliaries we need have no concern as to the ultimate result of any fair contest with the most approved form of electric lighting. Oil is the rival from which we have most to fear, and against which—when expense is the sole governing consideration—we cannot successfully contend at any price in excess of $1.25 per thousand cubic feet. While but few can, in the near future, hope to reach this figure, many of us are now selling gas at prices which a few years ago would have been considered ruinous rates; and yet our net gains, or divisible profits, have not diminished to such an extent as to materially impair the value of investments in gas properties.

Every reduction broadens the avenues and paves the way to increased consumption, and will, at no distant day, solve the problem of how best to allay annoying fears of so-called competition. How to secure this very desirable increase of consumption and maximum economy of production are the two most important problems presented for the consideration of the young and enterprising engineers who are now coming upon the field of action, backed by the experiences of the past, the opportunities of the present, and the golden promises of the future.

I am not insensible to the fact that many members of our profession have in the past shown no lack of that inventive genius, energy, and perseverance which enabled them to surmount the most formidable obstacles; yet I still feel that the constantly increasing importance of our industry demands that the younger members of the profession should possess a more thoroughly scientific education than it has been possible for the older ones to acquire. It is true that men have in the past accomplished great works without fully comprehending the scientific principles upon which such success was founded—"earlier generations have done, and later ones have explained how it was possible to do;" but in this age scientific knowledge has become a necessity to those who aim at a high standard in any constructive art or mechanical pursuit.

I have no fear that these young men will not be able to maintain the very highest standard of present professional requirements; but if they are to occupy the position to which many of them are justly entitled they should not neglect the constantly increasing opportunities of basing a thoroughly practical education upon a course of scientific training—both necessary to success in reaping the advantages of a sound common-sense application to the daily duties of their profession. Technical knowledge without ability to properly apply it is as fruitless as are efforts to practically achieve great result without a knowledge of the scientific principles upon which they should be based.

None of you should be satisfied to sit at the feet of any man—not even the most illustrious of those who have gone before; but be at all times prepared to meet and master the greater responsibilities which are sure to be forced upon you. Couple with such an education the capacity to quickly comprehend and ability to clearly explain, and the benefits to be derived from such an association as this are incalculable.

Already do we feel the good results which have been brought about by a clearer understanding of our mutual dependence. While the influence will be felt more directly in the matter of efficiency in management, it is hoped that it will also have an equally beneficial effect in shaping legislation and properly directing public policy in its relations toward the gas industry.

While we may properly congratulate ourselves over the results of our past efforts, let us look forward to a still brighter future, to be attained by a stronger and more intimate association, which shall bring together in full sympathy and accord not only the wage-workers of our profession, but all those whose material interests are directly affected by the prosperity of our business.

On motion of Mr. McMillin, the President's address was referred to a committee (to be named by the Chair at a later period in the proceedings) of three to consider the suggestions contained in the message, and report back thereon, if possible, at present meeting of the Association. In case the committee could not hand in a report at this session, the findings might be presented at the meeting of 1887. Adopted.

(To be Continued.)

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

RYDE, Mar. 10, 1886.

The Extension of the Use of Gas for Purposes other than Lighting.—The Disposal of Foul Lime.—Effect of the Fall in the Market Values of Residuals on the Gas Industry.—English Rating Laws.

At a meeting of the Midland Association of Gas Managers, held a few weeks since, an important paper on the subject of letting gas cooking stoves on hire was read by Mr. Alfred Colson, manager of the Leicester gas works; and it was followed by an equally important discussion. The paper consisted of a complete account of the experiences at Leicester in connection with this subject, from the time of its inauguration some five years since, including particulars of rates, etc., and also a clear and plain statement of the financial results. And the most salient part of the discussion was that which turned upon the possibility of fixing gas stoves or ovens as a permanency in houses, just as coal stoves and kitcheners are fixed. It appeared that if a stove is built into a chimney breast, say by the side of an ordinary coal stove, the surrounding brickwork will conduct away the heat so rapidly as to render the appliance useless; but if the simple precaution of using a jacketed stove, or of surrounding an ordinary stove with non-conducting material, is taken, this objection will not obtain. The President (Mr. Annan, of Wolverhampton) mentioned that he fixed a gas oven lined with glazed tiles in his house thirty years ago, and that it was still in use. Another interesting item was the fact that in some modern houses suitable recesses and means of ventilation for gas stoves had been provided by the architect. It is certainly a great practical drawback, both as regards cooking and heating gas stoves, that they are usually fixed haphazard as regards ventilation; sometimes with no provision at all in that way, and sometimes to an ordinary chimney, which is large enough for twenty such stoves. So the question of inducing architects and builders to make permanent provision, when building houses, for the accommodation of gas stoves is well worthy the attention of every gas engineer.

One difficulty peculiar to English gas managers has recently been exemplified by the proceedings at Norwich in relation to an alleged nuisance, said to be caused by the gas company of that town. The English legislature has been pleased to enact that gas must be purified from sulphur to a ridiculously infinitesimal degree—to within one-fifth of a grain per cubic foot, or something less than one-thousandth part. There is only one way in which this onerous condition can be complied with, and that is by the use of large quantities of lime. The used lime is a useless product, there being no known means of turning it to account. It is a compound of such a complicated chemical nature that words of from six to eight syllables are necessary for the designation of its constituents, and, moreover, it is addicted to the evil habit of evolving sulphuretted hydrogen and other noisome vapors on every possible occasion. Under some circumstances it is possible to reduce the lime to the condition of a clean and practically inodorous carbonate before rejecting it; under others, it must be removed whilst in the condition above indicated. When the latter class of conditions obtain, and the gas works is situated in a closely inhabited locality, the difficulty of removing the spent material without causing nuisance is great. This appears to be the condition of affairs at Norwich, and the arrangements made by the gas manager appear to be the best possible under the circumstances. He had obtained permission from the owners of some waste land, situated at a considerable distance down the river which flows through the town and past the gas works, to deposit the material there, and it was loaded into barges and removed during the small hours of the night only. It seems that certain odors evolved themselves during this process and thrust their unwelcome presence into the sleeping apartments and olfactory organs of some neighboring inhabitants, causing them to be "seriously unwell." One would imagine, having received such complaints, that the Medical Officer of Health, accompanied perhaps by two or three of the committee, would call upon the manager, and in the course of half an hour's informal and friendly conversation arrive at a satisfactory solution of the difficulty. Such a common-sense and humdrum course does not suit the English town councilor or alderman. How could the editor of the local paper (the English ratepayer's representative, by the way, shows a remarkable proclivity for acquiring an interest in a local news sheet, and is evidently a firm believer in Mrs. Brown's advice, "'Ave a horgan") make up a paragraph illustrating the public spiritedness and energy for the public weal evinced by the officials in question, out of such a tame way of settling affairs. No! they do things very differently at Norwich. In the first place, the Sanitary Inspector, who is so innocently ignorant of the manufacturing processes carried on in his district (which is just the sort of information that an officer holding such a capacity should have at his fingers' ends) as to need the assistance of a detective officer, is instructed to call the chairman of the Sanitary Committee immediately whenever the cause of the stench was spotted. Accordingly, at 1 A.M., on a cold, wintry morning, this energetic defender of the public was roused from his peaceful slumbers by the two investigators, and hurried off to a bridge overlooking the river, there to behold the appalling sight of a barge being loaded with refuse lime. Having duly appreciated this sight, the trio proceeded to the gas works; but the man in charge (probably in the darkness mistaking the staid councilor and his two coadjutors for locked-out roysters bent upon some practical joke) refused to admit them without an order from the manager. Nothing daunted, they proceeded to rouse the gas engineer, who wisely refused to attend to business at that untoward hour, but courteously undertook to see the town clerk later in the day. Land attack failing, there was still the briny deep; so the brave army secured a boat, and proceeded to the river front of the gas works. It was then found that the barge had been loaded and despatched down stream. Pursuit was instantly made, the vessel was overtaken, and promptly boarded, with the object of purloining a sample of the cargo. All this having been duly represented to the Town Council, and published in the local papers, the Sanitary Committee was empowered to take action; and so legal proceedings will probably be commenced. It is said that the Emperor of China fees his physicians, not when he is ill, but only while he is in good health. When cumbrous and costly legal processes are set in motion to effect that which in the end can only be effected by a plain, common-sense understanding between the parties concerned, one cannot help wishing that the system could be introduced in regard to English lawyers. We may be certain that the efficient manager of the Norwich gas works does not delight in rendering his neighbors "seriously unwell;" the precautions already taken indicate that he is fully alive to his responsibilities in the matter, and that if necessary he will cover the barge load with earth or ashes, or adopt other means for the mitigation of the nuisance. Local authorities should understand that gas engineers do not produce "Blue Billy" from choice, but that such has been rendered imperative by an overwise legislation.

The balance sheets and statements of accounts for the half year, ended Dec. 31st, 1885, are now being issued, and the first matter to which attention is directed is the effect of the fall in the prices of tar and ammonia upon the important item of "balance available for profit." As I have before pointed out, the fall in the price of tar, from $200 or $250 per ton to a merely nominal price, together with the concurrent reduction in the market value of ammonia to the extent of 50 per cent. or so, is a very serious consideration. Fortunately, however, the effect is not so marked as might be anticipated. Although in these respects fortune has been unfavorable, circumstances of a counteracting nature have also prevailed. Notwithstanding depressed trade, the demand for gas continues to increase. The markets have also been favorable to the purchasers of coal and iron. Coke continues to grow in favor as a household fuel. The net result is that full dividends have been paid, with but few exceptions, and as things cannot be much worse with respect to the prices of tar and liquor than at present, we may conclude that, in the absence of other adverse circumstances, there is no occasion for anxiety.

There are some complaints as to the exorbitance of rating assessors—and, by-the-way, I don't remember telling you at any time of the muddle that our English rating laws are in. In each parish an assessment committee is elected from the principal ratepayers, and these worthies are, of course, directly interested in raising the assessable value of their neighbors' property, as it leaves the less for themselves to pay. They are assisted by a professional surveyor and valuer who, in order to get at a fair valuation of a gas

works or other manufacturing concern, applies the simile of a house let to a yearly tenant. He takes the annual receipts, allows certain deductions, and calls the balance the ratable value. Or sometimes this item is arrived at by simply taking a certain percentage on the capital expended. The difficulties of appeal against excessive valuation are great. In the first place, the appeal is heard by the assessors, who are interested in resisting it. This failing, the matter can be brought before the magistrates, who are much in the same position, being large owners of property in the district. It can also, by experience and cumbrous processes, be carried to higher courts, but then the unfortunate company is much in the position of going to law with its best customers. The law is so loose that the assessment comes out very much as the assessors choose to make it. Generally speaking, common sense prevails, and an amicable agreement is arrived at; but in some cases the gas undertaking is called upon to pay as much as one-seventh of its total receipts to the local authorities. These cases are so rare that there is no general discontent or call for a proper basis for fixing the ratable value of gas undertakings. Still it would be better for all parties concerned if such existed, and it should be based as directly as possible upon the actual profits earned.

Sterne & Co., Submit to a Perpetual Injunction.

Some time ago the London *Journal*, in its legal intelligence news, said: "The case of Otto v. Sterne (L. Sterne & Co.), which it was understood was settled previous to the action of Otto v. Steel, was called up on the 1st of February in the High Court of Justice—Chancery Division—before Mr. Justice Pearson. The attorney for the plaintiff stated that the case had been standing out of the paper pending a settlement, and the parties had now arranged terms. The defendant had agreed to submit to a perpetual injunction, and to pay the costs; the plaintiff on his part not pressing for any inquiry as to damages. The attorney for the defendant agreed to these terms, and the order was made accordingly."

Laying Out Holes for Drilling.

The *American Engineer* explains that in all classes of work where the exact position of a drilled hole is a matter of importance, some care must be taken in first laying out the position of the hole, and, second, in drilling the same exactly in that position. The following method, which we believe is very generally used, we insert here not merely because it may be useful to a few, but because a little review of old methods is sometimes a good thing. First, rub the surface of the material, where the hole is to be drilled, with chalk or blue vitriol, as mentioned in a note on laying out work on cast iron in our issue of Feb. 25, and prick punch very lightly the exact center of the required hole. With a pair of small compasses draw concentric circles about the center formed by the prick punch, and let the larger of these circles be slightly larger than the diameter of the drill to be used. Do not draw the circles nearer than 1-16th inch of each other. Now with the prick punch dot round the circumference of all the circles except the outer one. Do this carefully. Now place the work under the drill and begin the drilling; and after the point of the drill has got fairly started raise the drill and see if the hole it has started is concentric with the circles previously drawn. If it is not concentric it can be made to "run" to the center by taking a round-nose chisel, with a cutting edge about $\frac{1}{8}$ inch wide, and cutting a grove from the upper edge quite down to the center of the hole started, and on that side of the hole toward which we wish the drill to run. The amount of metal to be removed by the chisel can best be determined by practice. After having cut away what appears necessary, try the drill a little further, and after raising the drill see if the hole it is forming is concentric with the circles. If it is, proceed carefully until the full size of the drill has entered the work. If it is not concentric more cutting with the chisel will be required. The above method of causing the drill to run to one side or the other can only be used *before* the drill has entered the work to its full size, so care must be taken when the drill is first started, as it will be useless to try to make it "run" over to one side or the other after it has entered the work to its full size.

Notes from the West.

By Retort.

In the March 16th issue of the Journal appeared an "item of interest" introduced as follows, "Quite a boom in gas matters is reported from Waco;" and "boom No. 2" occured about 6 P.M. on March 13, when the little city of Waco, Texas, was thrown into the wildest excitement at the explosion of the gas works. It seems the disaster was caused by the awkward manner in which a barrel of gasoline was handled by one of the employees. The works were situated on the banks of the Brazos river, but a certain portion of the plant was deposited, on the night in question, in the bed of the stream. Sam Cash, one of the hands, accompanied that portion of the debris in its flight through the roof, and landed with it in the Brazos. W. E. Mason, another of the workmen, was badly burned about the face and neck. His eyebrows and hair are all gone, and he presents a ghastly appearance. The buildings destroyed probably cost $5,000; and a further damage of about $2,500 on machinery brings the total loss up to $7,500. Part of this is covered by insurance. The holder was perhaps three-fourths up; but by midnight the supply was exhausted, and Waco was left in darkness.

The St. Louis Combination.—The never-ending St. Louis (Mo.) gas troubles have reappeared upon the surface, and come up more smilingly than ever. It has been a mooted point (since the cessation of active hostilities) as to which was actually "on top"—both sides claimed to be in possession of a majority of the stock; but the developments of the past few days show the water gas diplomats to be in the lead, with the old St. Louis Company a good second. Saturday last (Mar. 20) the first steps were taken (in the matter of organizing a combined opposition to the Laclede) by the practical formation of the "St. Louis Gas Trust." The "Trust" is composed of the St. Louis, the Water Gas, and the Carondelet Companies, and its object is the protection of the interests of those companies, and the ultimate control of the entire gas interest of the city. The Trust is the child of the Philadelphia water gas syndicate; and its formation is the result of a great deal of fine work and skillful engineering. It indicates a fight of a very mixed nature, as the Philadelphia syndicate, with the St. Louis Company, will cross swords with the New York combination and the Laclede Company. We venture to predict that the final result will be a grand consolidation, *a la* New York.

["Retort" here appends the financial details of apportionment as proposed by the Trust; but these will have to go over to issue for April 16.—Ed.]

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

New Holder for the Lynn (Mass.) Works.—Messrs. Deily & Fowler, proprietors of the Laurel Iron Works (Phila., Pa.) have entered into a contract with the Lynn (Mass.) Gas Light Company to erect a gasholder at the latter's plant. The holder is to be 80 feet in diameter, with 20-foot lift. Work on same is to begin forthwith.

The Keller Coke Crusher.—Mr. T. W. Cole, Supt. of the Altoona (Pa.) Gas Company, has put in one of the Keller Coke Crushers, and he reports that the machine is perfect in its operation. Three sizes of the crusher are now on the market; of these No. 1 is listed at $200; No. 2, at $168; and No. 3, at $146—the last description is worked by hand power. A discount of 25 per cent. is made from the above rates in consideration of cash payment. The prices include charge for wooden frame and screen. Superintendents will invariably find coke crushing to be a most profitable operation.

Mr. Cabot in Roomier Quarters.—So great has been the demand for the Church reversible purifier screen that Mr. Jno. Cabot (who has the sole right to manufacture and dispose of the same) has transferred his headquarters and shipping point to this city. He is now located at No. 306 to 310 Eleventh avenue, and has facilities equal to satisfying any demand that may be made. In addition to the screen department, Mr. C. explains that he can, at short notice, supply any sort of light woodwork required by gas companies. During 1885, Mr. Cabot furnished outfits of Church trays to no less than 71 different gas plants.

The Hopper Automatic Differential Gas Governor.—The Hopper automatic governor is making its mark. Mr. Hopper informs us that he has orders on his books which call for the immediate delivery of the following sizes of that instrument: One 16-inch; one 12 inch; two of 8 inches each; and one 6-inch.

Change in the Firm of Wm. Gardner & Son.—The name of a sterling firm which has been before the eyes of the fraternity for many years—that of Messrs. Wm. Gardner & Son, of Pittsburgh, Pa.—has been changed to the title of Jas. Gardner, jr. The new arrangement became a fixed fact on date of first ultimo, and owes its origin to the fact that Mr. Wm. Gardner's health would no longer permit him to devote his entire time to the fatigues and cares of active business pursuits. Wisely paying heed to nature's warning, he abdicated in favor of his son, Jas. Gardner, jr., who, we may add, is amply qualified and well equipped to sustain and carry forward the name and fame of the old establishment. It is, of course, almost unnecessary to add that Mr. Gardner, sr., will still keep a "fatherly eye" over the works at Lockport Station, Pa.

Natural Gas for Abilene.—The City Council of Abilene (capital seat of Dickinson county, Kansas) has granted an exclusive franchise to Mr. Nathan Blivens, by which the latter secures the right to furnish natural gas to the people of that place for a period of 21 years.

Lamps in the Kansas State House.—It is reported that the supply of gas to the State House (or government buildings) in Topeka, Kansas, has been shut off, with the result that oil is the illuminating agent employed to light the various departments there. It is in consequence of the law passed at the late session of the Kansas legislature, the act specifying that it is a criminal offence for any State official to incur expenditures other than those expressly authorized by law. It appears that gas lighting was not "expressly" authorized, hence the oil lamps. Will our Topeka friends kindly post us in regard to this matter?

New Bench Construction at the Williamsburgh (N. Y.) Works.—An extensive installation of the Weber regenerative furnace is to be made at the works of the Williamsburgh Gas Light Company, the managers of that plant having given Mr. Weber authority to build a stack of 20 benches of sixes, the heating arrangement of same to be in accordance with the plan devised by the proprietor of the Manhattan Fireclay Works. The retorts, as well as all other firebrick material to be employed in the construction, will be supplied by Mr. Weber. Among other items connected with the contract, we note that the specifications call for the erection of a chimney to be carried to a height of 100 feet.

Little Falls (N. Y.) Street Lighting.—The town authorities at Little Falls have made a contract with the local gas company in the matter of street lighting; and "Cap." White and the town-folks are perfectly well satisfied over its terms. The price agreed upon was $24 each per annum for gas lamps; oil or naphtha lamps to be paid for at the rate of $18 each per annum. The town covenants that no less a total than 150 lamps will be maintained; that oil lamps may be exchanged for gas burners, while gas lights may not be exchanged for oil lights. The lights are to burn during 26 nights of each month; are to be lighted 30 minutes after sunset, and may be extinguished one hour before sunrise. For this service, on the present number of lamps in use at Little Falls, the Gas Company will receive an annual payment of about $3,000. The contract is to run for five years.

Price of Gas Reduced at Oakland, Cal.—On March 1st the Oakland Gas Light Company reduced its selling rates from $3 to $2.75 per thousand cubic feet. The reduction granted can in no sense be attributed to discontent on the part of either the municipality or the consumers; in short, it was dictated by the desire of the managers of the plant to increase their business and profit.

Removal.—The business offices of the Bay State Gas Company have been removed from the Mason Building to No. 4 Rialto Building, Boston, Mass.

Day Consumption at Hartford, Conn.—Mr. John P. Harbison (who bears his Presidential honors with hardy fortitude) informs us that the day consumption (average for the year) of the Hartford Company figures up at 14.01 per cent., actual calculation. December yields the highest return—19 33 per cent.; April is at 11.37 per cent.; and its twin month (September) registers at 11.38 per cent. Over 800 gas cooking stoves are in use at Hartford; but the Eastern Association's President-elect declares the thousand mark *must* be reached in short order. Where there's a will there's a way; and Harbison has both will and way.

To Keep Experimental Wet Meters and Meter Provers in Order.—In reply to E. H. B.'s (of Vincennes, Ind.) query in regard to matters mentioned in above headline, we would say: Distilled water, carefully filtered, makes the best filling liquid. Meter provers should be occasionally emptied, tank and holder well cleaned, and then apply a coating of good mineral paint. When not in use keep the holder out of the water. The great point to be observed is to keep the vessels clean.

Cheaper Gas for Canton, Ohio.—From date of first ult., the Canton Gas Light Company's net selling rates have been as follows:

1,000 cubic feet or less, per month	.....	$1.90	per M.
1,000 to 3,000 cu. ft.	"	1.85	"
3,000 to 8,000	" "	1.80	"
8,000 to 20,000	" "	1.70	"
Over 20,000	" "	1.60	"

In all cases where accounts remain unsettled after 10th day of month in which the bills are presented the gross rate of $2 per thousand will be charged. The Canton gas folks evidently mean to secure an increase in send-out over that of former years.

Reduction in Selling Rates at East Boston, Mass.—Mr. J. H. Burnham, Supt. of the East Boston Gas Company, informs us that all gas registered on consumers' meters from date of first inst. will be charged for at the rate of $1.85 per thousand cubic feet. This is a concession of 15 cents per thousand from former schedule. The company is in an exceedingly prosperous condition, the best evidence of its financial standing being furnished in the figure published in our stock report some few weeks ago. A reference to the statement then made shows that East Boston shares were disposed of at a premium of 64 points.

The Damage was Slight.—On March 3d a fire occurred in the building at Nos. 34 and 36 West Monroe street, Chicago, Ills., a portion of which contains the show room and offices occupied by the Western branch of the firm of D. McDonald & Co., of Albany, N. Y. Some damage was done to the stock of meters on hand; but luckily no interruption of consequence took place in regard to the ordinary transaction of Western and Southern business of the company.

The Quality of Omaha (Neb.) Gas.—The U. G. Imp. Company's elephant at Omaha appears to be getting rather heavy, and the halter is becoming rather attenuated. A correspondent "out that way" throws the following light upon the situation as it actually existed on date of March 17th. "Sometime ago (towards the close of '85) the Omaha newspapers began paying their respects to the manipulators of the Omaha gas works. The newsmen called the attention of the people to the perils involved in the use of the Omaha gas company's carbonic oxide mixture; and it was not long before a strong demand was made by the people for better gas and better service. The company's managers ignored the 'cry for reform,' until forbearance on the part of the public ceased to be a virtue, and it began to look as though something was 'ready to drop.' At this juncture (Feb.) the company promised to make a reduction in selling rates; but when the March bills were presented it was seen that they were made out in accordance with the old schedule. The newsmen advised the consumers to refuse to pay their bills; and the citizens immediately suggested the buying out of the plant—under the original franchise the city had a right to take such action in '83. The city could on that date take possession by paying therefor a sum equal to the actual cost, with certain interest moneys thereon. On Tuesday, March 16th, a resolution (drawn up by the City Attorney) was presented to the Common Council which authorized the repeal of the gas company's franchise. To expedite matters it was, under suspension of the rules, read twice and referred to the Committee on Gas for prompt report; and unless the gas folks succeed in 'Jake Sharping' the committee (a thing improbable) the title of the Omaha Gas Manufacturing Company will be changed somewhat in the near future. The unsavory odor emanating from this company is sufficiently strong to be scented down as far as New York. I do not believe the concern has a friend in the entire city of Omaha; and the selling rates will have to 'take a big tumble,' or else the company will be kicked clean out of the town. There is blood in the eye of the average Omahaite, and it will take hard work to satisfy him." We fear that the Imp. Co.'s financial agents will be put to the painful necessity of printing another book. Will "one who knows" kindly forward us the particulars of the Common Council's final action? [Advices, dated March 25th, show that an application has been made to City Council for a franchise for an opposition company. On March 23d the Omaha Gas Manufacturing Company gave notification that all gas consumed from date of first ult. would be charged for at the gross rate of $2 per thousand, and those who paid their gas bills within ten days from date of presentation would be entitled to a rebate of 12½ per cent.]

Killed by an Electric Shock.—The New York *Times*, of March 21st, contained the following despatch: "Phila., Pa., March 20.—D. Coyle, 25 years old, a lineman in the employ of the Northern Electric Light Company, to-night climbed an awning post at Second street and Girard avenue to secure a broken electric light wire. He supported himself by holding the wet iron post with one hand, while he caught the end of the broken wire with the other. Immediately upon grasping the wire he received an electric shock and fell to the street, dead. Coyle had several years' experience in the electric light service, and was considered a most careful man."

They Have Come on to New York.—On March 18th the Bay State Gas Company filed its certificate of incorporation in the office of the County Clerk of New York city. The names on the document are those of Messrs. Sidney Ward, James G. Janeway, Allan McCulloh, and David Paton. The company is at present capitalized at $5,000,000—very good for a beginning. Indeed the figures are most imposing.

Changes at Paris, Ill.—At a directors' meeting of the Paris Gas Light and Coke Company, (held on March 13) Mr. A. Bruce Powell was elected Superintendent, vice Mr. W. H. Levings, resigned; Mr. Z. E. Powell was elected Secretary; and Mr. R. N. Parrish was chosen Treasurer, vice Mr. C. W. Powell, resigned. The Paris *Gazette* does not speak very highly of the proposition to light Paris by electricity. It appears that a certain Mr. Ol is very anxious to put the scheme through, and claims the taxpayers will save a sum equal to $7,876.37 per annum if his plan is adopted. In view

of that nice plum the *Gazette* very pertinently asks why Mr. Olds does not propose to put in the electric light plant and operate it himself, thereby (provided the Council gives him a grant at the figures proposed) putting the seven and nine-tenths thousands per annum into his own pocket. Not much; Mr. Olds is scarcely "new" enough at the business of supplying electric lighting to undertake the job. He would much rather take a 6 or 7 per cent. Paris bond in return for sundry dynamos, miles of wire, engines of a certain horse power, etc. Olds is far from childishness yet.

CHANGE OF MANAGEMENT AT SHARON, PA.—Mr. D. R. Shiras, after serving 13 years as Superintendent to the Sharon Gas and Water Company, has retired from that position. Mr. Joshua Gill, formerly in charge of the Bridgnorth (England) Gas Company, but more recently in the service of the Boston (Mass.) Gas Light Company, has been appointed to succeed him. Mr. Shiras was a faithful servant.

TO TAKE CHARGE AT MINNEAPOLIS, MINN.—We understand Mr. W. H. Levings resigned the Paris Superintendency so that he might take charge of the Minneapolis plant. Levings has a host of friends in the fraternity. We wish him every possible success.

KILLED BY THE ELECTRIC CURRENT.—A correspondent informs us that Edward Oliver, formerly in the employ of the Evansville (Ind.) Gas and Electric Light Company, recently lost his life while engaged in an attempt to adjust the brushes on one of the dynamos. A screw in one of the brushes became loose, and Oliver was taking it out to replace it with a new one when he suddenly exclaimed, "My God; I am shocked." Our informant adds: "Oliver was one of the best informed men about the works, and had been connected with the Company about three years."

ELECTRIC LIGHT FREAKS AT RICHMOND, VA.—The sample of street illumination furnished by the station of the Schuyler Electric Company at Richmond is more than ordinarily erratic. About every other night the "arcs" refuse to buzz, and the streets are in darkness until the gas lamps are put in duty. Sunday, Mar. 21, was as "mean a night" in Richmond as could well be imagined; but the people who braved the storm for the sake of attending evening church service, in going had to grope their way in the dark, although the gas lamps enabled them to return home in safety. The next evening was like unto its predecessor—in both the matters of storm and arc eclipse. The Schuyler folks explained that their "second (or duplicate) engine had not yet been connected with the shafting, and the original engine had a hot box." That hot box also heated up many a Virginian's temper.

TO FURNISH GAS TO A PORTION OF WESTCHESTER COUNTY, N. Y.—The Citizens Gas Light Company, of Westchester County, has filed articles of incorporation. It is the purpose of the Company to supply gas to the inhabitants of Rye, Harrison, New Rochelle, and Mamaroneck. Capital stock of Company is placed at $400,000.

THE JACKSON (MISS.) GAS COMPANY CHANGES HANDS.—A controlling interest in the stock of the Jackson Gas Light Company has been secured by Messrs. Calhoon, Robinson, and their associates. At the reorganization meeting Judge Calhoon was elected President, and Mr. C. W. Robinson (who is also Secretary of the Meridian Company) was chosen Secretary and Treasurer. The work of remodeling and extending the Jackson plant is to be begun forthwith, and it is also understood the new management will shortly signalize its accession to ownership by granting a reduction in selling rates to the extent of 20 per cent. in comparison with former ruling price. Mr. Ward retains the Superintendency.

THE LATEST COLUMBUS (OHIO) GAS SCHEME.—According to the tenets of a bill recently introduced, by a Mr. Sullivan, in the Ohio State Legislature, it is proposed to confer power upon the managers of the Columbus State Penitentiary gas works to lay pipes in the streets and avenues of Columbus for the distribution of illuminating gas. The bill also appropriates the sum of $30,000 to be expended in the "purchase or appropriation of additional ground adjacent to said penitentiary" for said purposes. Truly, this is the age of penitentiary products; but who would think that the era of penitentiary gas was approaching. Even if Mr. Sullivan's project is enacted into law we think the Ohio courts would speedily relegate it to the limbo provided for the "remains" of unconstitutional measures.

THE AMERICAN GAS COMPANY.—The charter of the American Gas Company, of Philadelphia, Pa., was recorded in the Quaker City on March 24. Governor Pattison issued letters patent to the Company on March 22. The nominal capital stock is placed at $100,000; the principal office is to be located in Philadelphia; and the directors to serve for first year of its existence are Messrs. L. A. Riley, J. W. Hoffman, B. W. Gaskill, W. McLaughlin, and E. Swain, all of Philadelphia. The true purpose of the American Gas Company will be explained in good time, and it is quite likely to make itself felt. If we do not sadly err, those who are responsible for its birth are men of vigorous purpose, and are amply equipped with the right sort of weapons to carry on their intended lines of attack.

STREET LIGHTING MATTERS AT LANCASTER, PA.—The streets of Lancaster have been lighted by means of Maxim arc lights during the past year, and the matter of renewing the contract for a year from next June was recently discussed in that city's Councils. Bids for the lighting were submitted by the gas company; also by the Maxim arc and Edison incandescent companies. The first-named bidder did not care whether it was successful or not, as there was no money in it at the price proposed, and so the fight was really narrowed to a duel between the other companies. After much palaver it was finally decided to renew the contract with the Maxim folks at the reduced rate of 36½ cents per light per night—provided they would agree to complete the balance of the present contract (the interim between March 1 and May 31) at the same figure. One amusing thing cropped out in the discussion. The Edison folks challenged the right of Mr. J. H. Baumgardner, of the Lancaster Gas Light Company—he is a member of the Common Council—to vote on the question (as between the two electric companies) on the ground that his company had submitted a bid for the work. This objection elicited from Mr. Baumgardner the remark that the gas company did not want to light the streets; and that he asked the chairman of the lamp committee to withdraw the gas company's bid. Mr. Baumgardner's vote defeated the Edison proposition, hence the Edison growl—a growl emitted because the Edison folks might want to borrow money to complete their station; and it would be so imposing to say to investors, "Why, we light the city's streets." Mr. B.'s company is now selling gas at $1.80 per thousand; and he says it will go lower.

INDEFINITELY POSTPONED.—At a meeting of the finance committee of Philadelphia City Council, Mr. Thompson moved that further consideration of the ordinance providing for the sale of the gas works be indefinitely postponed. The motion was agreed to. Putting one thing with another, it looks as though Widner, Elkins, *et al*, will be much older before they secure possession of the Philadelphia Gas Works.

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

Applying Gas Heat to Loosen the Tires of Driving Wheels.

MACON GAS LIGHT AND WATER CO.,
MACON, GA., March 16, 1886.

To the Editor AMERICAN GAS LIGHT JOURNAL:

As the following may be of interest to your readers, let me say that the Central Railroad Company, of Georgia, intends to change its gauge during June next; and, in consequence, the shops of that company present a very busy appearance—the engines and cars requiring alteration to suit the proposed new condition of track. Among other items the tires of the driving wheels have to be set back about three-quarters of an inch, and heat must be applied in order to loosen them. The old plan pursued was to place the wheels in a box containing charcoal, and, by means of an air blast, the temperature necessary to heat the tire was raised. This practice took up the labor of 12 men, working over 1½ hours, for each driving wheel; but the new plan greatly simplified matters. The Macon Gas Company ran a three-inch main to the round house—a distance of some 1,500 feet—and put in a 250-light meter, and the tire heating is now done by gas. The writer visited the round house to inspect the process and note the result, the details of which are appended:

The gas supply, passing through a two-inch hose, is connected to a ring of 1¼-inch pipe, about three inches larger in diameter than the driving-wheel, and perforated, on the inside, with one-eighth-inch holes, about one inch apart. An air pipe, from the blower supplying the forges, enters the gas pipe, in a Y just at the bottom of the circle, and the air feed is regulated by a stop at that point. The set or pair of driving-wheels is run on the track in the engine stall, and jacked up about six inches from the track; the pipe circle is put around the tire, the gas turned on, and then the air is let in until the blue flame impinges on the tire. The latter soon reaches the stage of expansion that permits it to be set back by the screw clamps placed in readiness. We witnessed the hea ing and setting back of six tires. In all, four men were employed. The first tire was heated and set back in 12 minutes; the second, in 11 minutes; the third, in 10 minutes; the fourth, in 10 minutes; the fifth, in 15 minutes; and the sixth, in 14 minutes. Gas used, 900 cubic feet; tires, 2¼ inches thick, and 5 feet in diameter. The entire time occupied—in shifting wheels, jacking up, adjusting clamps, etc.—was only three hours; and this, too, before the men had become accustomed to the work, and while we were experimenting to secure the proper admixture of air and gas. The master mechanic assured us that the same work would have taken all day, and 12 men, under the old conditions.

Respectfully, A. E. BOARDMAN, Sup't.

[It gives us real pleasure to say Mr. Boardman has entirely recovered from the severe illness that beset him during his last Eastern trip.—ED.]

Report the Matter to the Insurance Companies.

SHELBYVILLE GAS LIGHT CO.,
SHELBYVILLE, IND., March 20, 1886.

To the Editor AMERICAN GAS LIGHT JOURNAL:

An experience just encountered reminds me that a number of years ago, when we were very young in the gas business, we discovered that the telegraph folks were using our pipes, services, etc., for grounding purposes. I at once wrote to the source of light (THE JOURNAL), and received a very kind response from its then Editor, who said it was the universal custom, and no trouble had resulted. Upon my arrival at our office this morning I was met by a much excited friend, who informed me that the "Ray House was on fire; the trouble was in the gas; and they wanted it turned off." I seized my little "stillson" and rushed frantically to the scene of disaster, to find that the lightning had entered by means of a telephone wire, had used up the instrument, and burned out a wire leading to a bracket (some 10 feet distant) with which it was connected. The larger size of pipe gave the fluid a larger avenue, which it seized to reach the meter—the latter was *fortunately* located in one corner of the hotel office. The lead connection offered greater resistance than suited the whims of the current, and hence these results—some melted lead, a badly demoralized gas meter (not in the sense usually claimed by the average consumer), and a thoroughly frightened household.

Now, the question is, shall we order the telephone people to find some other way to get to the ground; report the matter to the insurance companies, so that they may make the "kick;" or go on, hoping, meanwhile, that the lightning will not again play us such a trick?

Respectfully,
G. W. F. KIRK, Sec'y.

The Market for Gas Securities.

The market for Consolidated gas has been dull and strong during the fortnight; and present indications point to a still greater increase in values. At 1:30 P.M., of March 31st, sales were made at 110, and it is presumed that Mr. Woerishoffer is once more in readiness to bound the quotation ball. Equitable sold at auction, on March 31st, at 158½–⅝, ex-dividend of 2½ per cent. payable this month—in all 150 shares were disposed of. Same day, 12 shares of Richmond county gas sold at 82. That figure is a very high one; and we congratulate the purchaser on the fact that he got only a twelve-share lot. Yonkers gas comes to hand with a dividend of 2 per cent., payable April 10th. This is the first return made to Yonkers shareholders since February, 1885, at which date 3 per cent. was divided. Due heed being paid to the circumstances, the old Yonkers company has done remarkably well. Tooth and nail it has fought the opposition gentry for a long series of years, and Mr. Cornell has no intention of caving in. Gas is sold there at $1.25 per thousand, and some of the street lamps which are kept in duty during 4,000 hours per annum are paid for at the rate of $13.92 per year. Forty-two shares of Yonkers gas, at auction, March 31st, at 46.

Brooklyn shares do not show much change. The Fulton Municipal pays a quarterly dividend of 3 per cent. on April 10th; and we cannot forbear remarking that the holders of old Brooklyn gas must feel an occasional sharp twinge when they remember certain things connected with the "resources" of the company whose plant adjoins the "headwaters" of Gowanus canal. In connection with Brooklyn shares we would again revert to the fact that Metropolitan gas looks like a purchase. The district in which the company operates is being taken up by fine residence structures, and its possibilities are of the most attractive sort. St. Louis shares are weaker—Laclede is down to 90; and old St. Louis is also troubled with a "decline." Eastern shares are all strongly held. It is understood that all branches of the Boston water gas operators are now working in perfect harmony. Baltimore shares are about as before. Jersey City shares are enjoying the ease attendant upon a signing of a truce. The Hoboken end of the line is about to be stirred up by Mr. Orestes Cleveland, who contemplates the erection of an opposition plant. California shares are active. As predicted, the San Erancisco Company is paying a regular monthly dividend of 30 cents per share—the last one was disbursed on the 15th ult.; the Pacific Gas Improvement Company paid a dividend of 50 cents per share on same date; and the Oakland Company disbursed 20 cents per share.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks.

16 Wall St., New York City.

April 2.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	109¾	110¼
Central	440,000	50	70	—
" Scrip	220,000	—	47	57
Equitable	2,000,000	100	158⅝	160x
" New Stock			150	155
" Bonds	1,000,000	—	107	110
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	113	—
Mutual	3,500,000	100	136	137
" Bonds	1,500,000	1000	104	107
Municipal, Bonds	750,000		—	—
Northern	125,000	50	50	—
" Scrip	108,000			
Yonkers		50	45	47

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